



Applying Behavioral Science to Policy

Three Lessons from Research on U.S. Retirement Security

Saurabh Bhargava

Associate Professor of Economics
Department of Social & Decision Sciences
Carnegie Mellon University

NASEM BE Workshop

July 2022

Applying Behavioral Science to Policy

Three Lessons from Retirement Saving Research



Digital Design

Attending to implications for consumer protection



Microincentives vs. Disclosures

Strategies for encouraging program take-up



Serenity Accounts

Financial anxiety as a barrier to future-oriented action

1. How do US employees presently save for retirement in the US?

- **401(k) plans have emerged as primary savings vehicle for US employees**
 - Traditionally three pillars of savings: Private savings, SSA benefits, and employer-sponsored plans
 - Employer-sponsored savings have shifted from DB to DC plans in recent decades – mostly 401k/403b
 - 401k is employer-sponsored plan that permits employers to deposit pre-tax wages into savings account
 - 100.2 million participants, \$6.3T or 23% of all retirement assets, (2016 Form 5500, Dec 2018)
- **Economic structure of 401(k) plan seen as highly attractive**
 - Tax-benefits are significant
 - Portable across jobs and mandated plan disclosures
 - Often generous plan match (80+ percent of plans offer match; modal match up to 3 percent of salary)
- **Adoption of automatic enrollment has led to an increase in participation**
 - About 75 percent of plans have adopted automatic enrollment (AE)
 - AE has dramatically increased averaged participation (90 percent, 2019 PSCA)

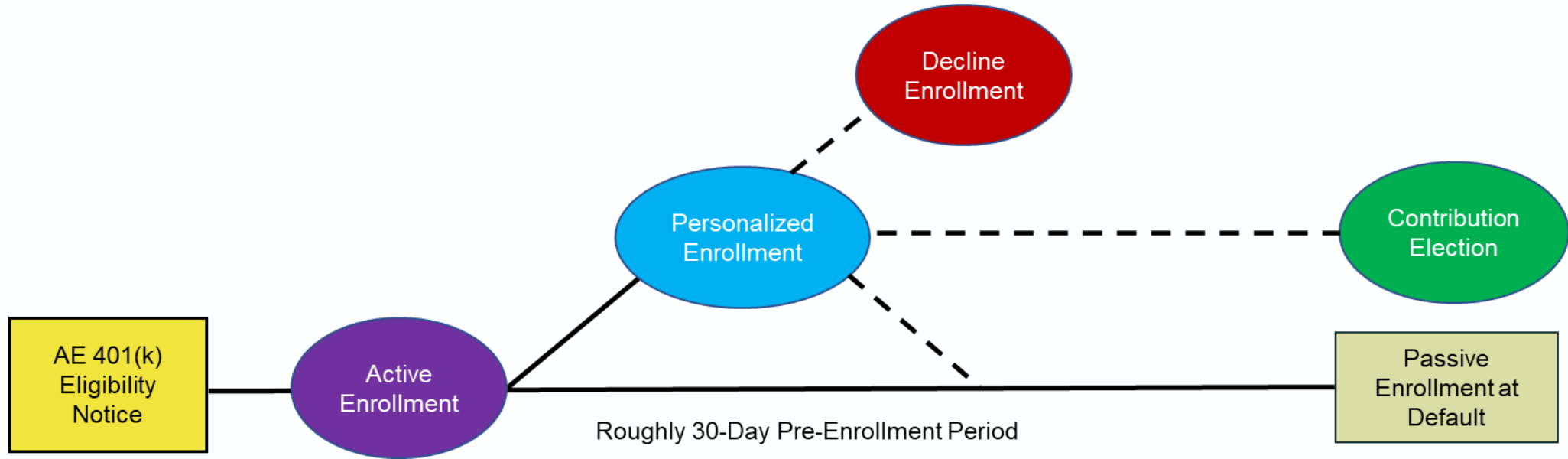
2. How severe is the problem of retirement security among US employees?

- Recognition that significant share of individuals, including US employees, are not saving sufficiently for retirement
- Define **retirement security** as a financial state adequate to meet basic housing, food, transport, health needs w/o reliance on family, work, or means-tested benefits (follows Elder Index, Mutchler et al. 2016)
- Focus of policy/industry largely on expanding 401(k) access and participation—greatly improved via automatic enrollment (AE)—but signs many actual 401(k) enrollees at risk
 - Estimates of significant loss in saving due to leakage (Beshears et al. 2020)
 - Industry/household surveys allude to high share of working households not on track for retirement
 - Many plans adopted automatic enrollment (AE), but behavioral structure of AE suggests hidden frictions

3. Behavioral structure of AE 401(k) plans suggest hidden decision-making frictions

- Default contribute rates (e.g., 3 to 4 percent) usually set below plan's match limit (e.g., 6 percent)
- Claiming full match requires two explicit decisions during initial enrollment – **active** and **personalized enrollment**

Behavioral Structure of 401(k) Enrollment



Decision #1: Active Enrollment

Employees decide whether to make an active enrollment decision by visiting online interface or to allow themselves to be enrolled at default rate

Decision #2: Personalized Enrollment

Employees decide whether to confirm automatic enrollment, personalize enrollment at a new contribution rate, or decline enrollment

Average Difference in Contribution and Saving across Mode of Enrollment

Please select one of the following options:

I want to enroll with different choices.

Note: This enrollment will cancel your scheduled automatic enrollment.

SELECT

I want to confirm my automatic enrollment.

SELECT

I do not want to enroll.

SELECT

	Personalize	Auto	Decline	
Contribution	7.8 percent	3.2 percent	0 percent	Average difference in contribution/saving across 501 AE 401k plans (Voya midsize)
Savings	11.1 percent	5.1 percent	0 percent	

3. Behavioral structure of AE 401(k) plans suggest hidden decision-making frictions

- Default contribute rates (e.g., 3 to 4 percent) usually set below plan's match limit (e.g., 6 percent)
- Claiming full match requires two explicit decisions during initial enrollment – **active** and **personalized enrollment**
- Initial enrollment could be critical for long-term financial security
 - Average personalized enrollee saves at a rate 2x as high as average passive enrollee (purely descriptive)
 - Considerable inertia in year-to-year plan enrollment choices (91% in some of our data)
- Employees make initial enrollment decisions in context of strong, and highly varying, design elements
 - **Plan Design** – Collectively refers to features of plan marketing and digital design of online enrollment portal
 - **Active Enrollment** – Plans vary in their use of marketing, reminders, persuasion to encourage active enrollment
 - **Personalized Enrollment** – Plans vary in digital design of online interface (color, syntax, layout, usability, interactivity of webflow) from which employee decide whether to personalize enrollment

Plan design of 401k enrollment varies considerably across major US financial providers

Examples of Enrollment Interfaces across Financial Providers

Enroll Now

ABC Company offers automatic enrollment. If you take no action, you will be enrolled at the plan's default pre-tax contribution rate (3%).

You may decline Automatic Enrollment below. Alternatively, you may enroll in the Savings Plan by choosing your own contribution rate and investment options.

☐ Decline Automatic Enrollment

Or

☐ Change Automatic Enrollment Rate

Remember if you take no action you will :

Cancel

I want to enroll with different choices.

I want to personalize my enrollment by selecting a different savings rate or investment option.

SELECT

I want to confirm my automatic enrollment.

I want my auto-enrollment to go through at the savings rate chosen by my employer.

SELECT

I do not want to enroll.

I want to cancel my auto-enrollment and not save at this time.

SELECT

Choose your investment path



Do it for me

Use your employer's pre-selected investments, fill in details later.



Do it myself

You decide all the details regarding your investments.

I GOT THIS

Examples of Personalized Enrollment Webflows across Financial Providers

Contributions

Pre-Tax Contribution Amount ?
\$117.69 every two weeks >

-

6%

10%

+

6%

10%

✔ A positive start! Your saving is off on the right foot. Now aim for 10%!

\$3,213/month
in retirement

You May Be SHORT

\$2,032/month
in retirement

Contributions

How much you save
Current
5%
(Per Pay Period)
Don't know how

Here's what your monthly income in retirement could look like.
Your estimate is based on your goals and the savings amount selected below.

1

1

1

1

You may have
\$4,267

You may need
\$4,375

The gap I need to close
\$108

☒ Include Social Security Retirement Income

[How did we come up with your number?](#)

[Change my retirement goals](#)

Sarah, now it's time to make your selections below.

Select an amount from your paycheck:

✔ Your employer matches up to 6% of your savings.

-

6%

+

While \$188 in PRE-TAX dollars goes in your account per pay period, only \$135 comes out of your take-home pay after taxes.¹

More Savings Options >

Select an investment option:

"Get me there"
with a professionally-managed account >

"Guide me"
with a pre-defined investment >

"Get there myself"
by choosing my own investments >

See All Investment Options >

GO WITH THESE CHOICES

And don't worry, you'll be able to make changes after you're enrolled.

CHANGE CONTRIBUTION

OF YEAR

\$18,500
PLAN MAX

YTD

Carnegie Mellon University

10

Research examining influence of digital design on 401(k) enrollment and retirement security (in collaboration with large US record-keeper, Voya Financial)

Save(d) by Design

Saurabh Bhargava*, Lynn Conell-Price**, Richard T. Mason**, Shlomo Benartzi***

Carnegie Mellon University*
Consumer Financial Protection Bureau**
Behavioral Finance Institute for Innovation, Voya Financial*
UCLA Anderson School of Management***

This Version: September 2021

We begin by presenting novel administrative evidence from 840 401(k) plans with automatic enrollment (AE) indicating that the risk of retirement insecurity extends to a significant share of actual *enrollees*. Hypothesizing that this risk is materially affected by the initial decision to enroll at the default rate or to personalize enrollment at a higher rate, we investigate the sensitivity of initial enrollment to non-economic features of digital design that increasingly shape plan engagement. Specifically, we describe three large-scale field experiments, administered across 500 AE plans, that vary the *psychological design* (i.e., color, layout, phrasing, informational salience) of the digital interface from which employees decide to confirm, personalize, or decline enrollment. The field studies, supplemented by hypothetical choice experiments and a survey of hundreds of plan administrators, yield four findings. First, we show that modest changes to the psychological design of the interface result in sizable increases in personalized enrollment, full match take-up, and average contributions—equivalent to those predicted from a 68 to 74 percent increase in the modal match. Second, we show that marginal personalized enrollees appear to increase their initial contributions substantially and to an extent equivalent to inframarginal counterparts, implying potentially significant welfare gains due to design. Third, lab evidence indicates that design does not affect enrollment through standard economic channels of preferences/beliefs or often-cited behavioral frictions (inattention, confusion, distrust) and suggests instead that enrollment may emerge from a non-deliberative process in which design shifts affective appraisals. Finally, an industry survey shows that most plan administrators underestimate the potency of design and cannot identify optimal design elements. The findings raise new concerns about the retirement preparedness of 401(k) enrollees, highlight the potentially profound, and largely unrecognized, influence of digital design on financial decisions such as savings, and challenge basic economic assumptions underlying prevailing approaches to consumer protection and welfare analyses.

Acknowledgments: We thank Linda Babcock, Karna Basu, John Beshears, David Card, Stefano DellaVigna, Jon Guryan, Kareem Haggag, Hilary Hoynes, Prasad Krishnamurthy, Paola Giuliano, David Laibson, George Loewenstein, Ted O'Donoghue, Mark Patterson, Vikram Potluri, John Payne, Jan Potters, Silvio Saccardo, Emmanuel Saez, Jesse Shapiro, Steve Shiu, Richard Thaler, Steven Thomas, and Giovanni Ugo for generous insight and feedback. We also thank our collaborators at Voya Financial (Voya) including Thomas Armstrong, Lombard Gubbaro, Daniella Lacro, Marilyn Morgan, and Charlie Nelson. Cassandra Taylor and Ben Schenck provided excellent project support. Mason leads the Behavioral Finance Institute for Innovation at Voya and is a Visiting Scholar at CMU; and Benartzi is a professor at UCLA and a paid consultant to Voya. Voya covered a portion of the human subject fees for the project and was provided an opportunity to review the manuscript before public release for confidentiality and factual accuracy. The authors retained full editorial control and any views, and errors, should be attributable to the authors and not to their affiliated institutions.

1. Are actual 401(k) enrollees at risk for retirement insecurity?
2. Does variation in digital design affect initial enrollment and long-run financial security?
3. What drives people respond to variation in digital design?
4. Are plan administrators aware of the potency of design?

1. Are actual 401(k) enrollees at risk for retirement insecurity?

- We assessed the probabilistic risk of retirement insecurity for 186,000 active enrollees employees using administrative data across 840 AE 401(k) plans across wide-range of plausible assumptions
- Specifically, we projected the distribution of potential savings for each enrollee by simulating their year-to-year asset accumulation associated with a wide-range of savings, market, behavioral assumptions



- [Observe] Age, income, balance, contribution, plan detail, auto-escalation
- Income growth [0, 1, 2 percent]
- Contribution Inertia [75, 90, 100]
- Contribution Cap of 10 percent
- No early withdrawal, loan, job turnover
- 60/40 portfolio [Low, Med, High]
- BlackRock Median: **N(3.5, 10.2)**
- BlackRock Low: N(1.6, 10.2)
- BlackRock High: N(5.6, 10.2)
- Retirement Age: [62, 65, 67]

1. Are actual 401(k) enrollees at risk for retirement insecurity?

- We assessed the risk of retirement security for 186,000 active enrollees employees using administrative data across 840 AE 401(k) plans under wide-range of plausible assumptions
- Specifically, we projected the distribution of potential savings for each enrollee by simulating their year-to-year asset accumulation associated with a wide-range of savings, market, behavioral assumptions
- We then mapped each projected level of savings to a lifetime guaranteed annuity and assessed whether this met one of varying retirement security thresholds (using the Elder Index), inclusive of Social Security benefits

Distribution of Potential Savings



- Lifetime Immediately Vesting Guaranteed Annuity w/ no minimum, no bequest, inflation adjusted (65 year old Male, PA) [Charles Schwab]
- **\$1,293/monthly** Social Security Benefits (median 2018 benefit)

Lifetime Annuity



≥
<

Retirement Security Threshold



- Pre-tax security thresholds: [\$150k, \$200k, \$250k]
- Elder Index estimates minimum income to ensure retirement security. EI 2020 for single elder (rent) is \$2,157/month

Risk of Retirement Insecurity for 401(k) AE Enrollees

Table 2.

Estimated Risk of 401(k) Enrollee Retirement Insecurity by Market Return Assumptions

Pre-Tax Accumulation Threshold [\$ Monthly Income]	Assumed Distribution of Future Market Returns			
	Low N(1.6, 10.2)	Moderate N(3.5, 10.2)	High N(5.6, 10.2)	Historic N(6.4, 9.2)
Panel A. Risk of Retirement Insecurity $\geq$ 25%				
\$150,000 [\$1,959]	0.42	0.34	0.27	0.25
\$200,000 [\$2,181]	0.54	0.44	0.35	0.32
\$250,000 [\$2,403]	0.65	0.53	0.42	0.38
Panel B. Risk of Retirement Insecurity $\geq$ 10%				
\$150,000 [\$1,959]	0.50	0.40	0.32	0.29
\$200,000 [\$2,181]	0.62	0.51	0.41	0.37
\$250,000 [\$2,403]	0.71	0.60	0.50	0.44

Notes: This table summarizes the share of 401(k) enrollees at risk of retirement insecurity for a range of asset thresholds (\$150k-\$250k) by row and a range of assumptions regarding market returns (Low, Moderate, High, or Very High). We fix the assumption that "at risk" means 25% or higher chance of falling below the asset threshold at retirement age 65. All estimates in this table reflect our preferred, moderate assumptions regarding market return expectations (mean 3.5, standard deviation 10.2 nominal annual return rate), contribution rate inertia of 75% (fixed annual probability of 25% (100% - inertia) of increasing contribution rate by 1% of income until reaching 10%), real wage growth of 1%, and retirement taxes of 10%. Reported monthly income includes both the annuity and estimated benefits from Social Security.

- Favored assumptions indicate **44 (51) percent of enrollees** have a risk of insecurity in excess of 25 (10) percent
- Substantial variation in average estimated preparedness across observationally similar employees in observationally similar plans

Risk of retirement insecurity for 401(k) enrollees more severe than stakeholders previously believed

2. Does variation in 401(k) digital design affect initial enrollment and long-run financial security?

- We investigated how variation in digital design affected 401(k) enrollment outcomes w/ 3 field experiments in collaboration with Voya Financial (2016 to 2018)
- Experiments randomized non-economic aspects of the landing page from which 8,565 employees from 501 401(k) AE plans make their personalized enrollment decision
- Experimental treatments:
 - Enhanced Presentation: Modifications to color, language, standardization of interface
 - Enhanced Information: Display of previously communicated information (plan default, match)
 - Enhanced Design: Enhanced Presentation + Enhanced Information
- Outcomes of interests:
 - Short-term: (i) Rate of personalized enrollment, (ii) Match take-up, (iii) Average Contribution Rate
 - Long-run: Projected years of retirement security

Basic and Enhanced Landing Page Design (Field Experiment #1, BCBS 2021)

Basic Design (used commercially prior to research)

Please select one of the following options:

I want to enroll with different choices. Note: This enrollment will cancel your scheduled automatic enrollment. SELECT	I want to confirm my automatic enrollment. SELECT	I do not want to enroll. SELECT
---	---	---

Experimental Treatment (“Enhanced Design”)

If you confirm your automatic enrollment you will be enrolled at a savings rate of **3percent**

Please select one of the following options:

Do it Myself I want to personalize my enrollment by selecting a different savings rate or investment option. SELECT	Do it for Me I want my auto enrollment to go through at the savings rate chosen by my employer. SELECT	I Don't Want to Save I want to cancel my auto enrollment and not save at this time. SELECT
---	--	--

Enhanced Design reworded headlines, standardized descriptions, and added traffic-color lights to baseline design – also displayed the plan default rate

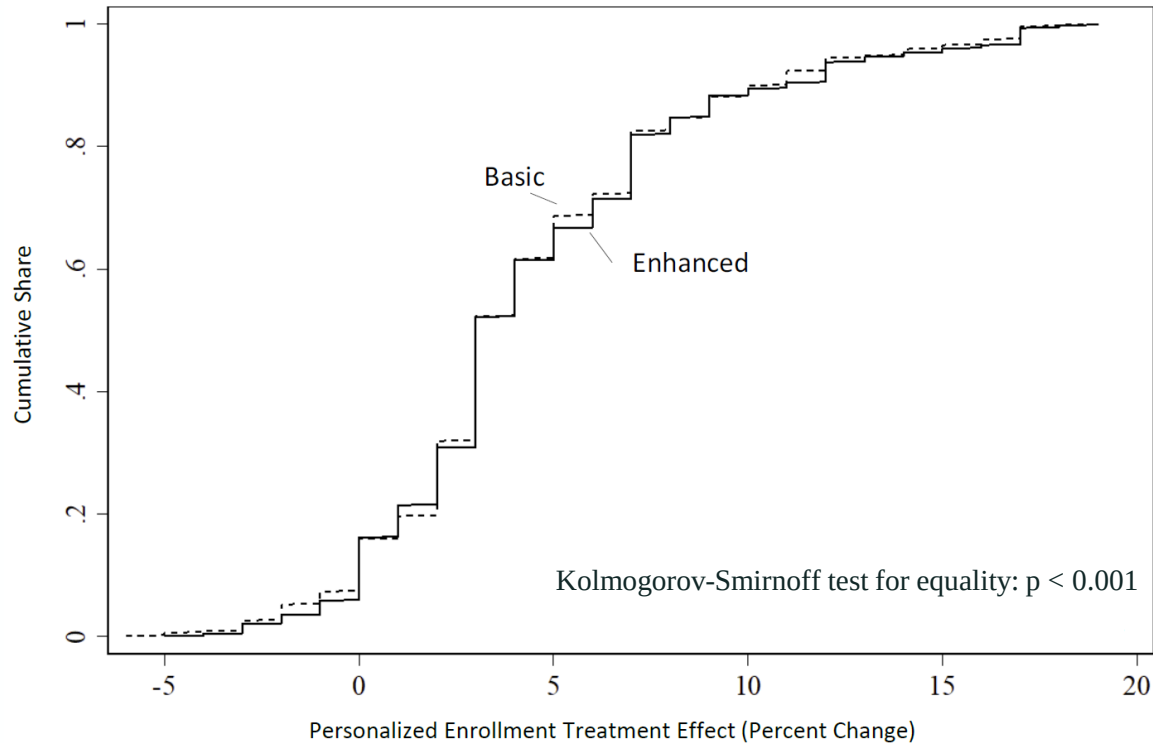
2. Does variation in 401(k) digital design affect initial enrollment and long-run financial security?

- Field experiments across 501 401(k) AE plans indicate that modest visual enhancements to design led to 15% increase in personalized enrollment (from 0.60 to 0.69) and a 13% increase in average savings rate (from 7.28 to 8.26)
- Marginal effect of design on personalized enrollment equivalent to that predicted by a 68% increase in the plan match (or the predicted increase associated with 11 years of employee age, all else equal)

To what extent do marginal personalized enrollees increase their saving?

Marginal – Inframarginal Equivalence (Personalized Enrollment)

Panel A. Distribution of Personalized Adjustments across Experiment Conditions



- In theory, we might expect marginal personalized enrollees to nominally adjust contribution (in contrast to average inframarginal enrollee who double their contribution)
- Normally hard to observe marginal behavior – this setting offers unique insight into marginal saving (an extensive-margin decision to personalize enrollment followed by an intensive-margin contribution decision)
- We can infer behavior of marginal personalized enrollees by comparing adjustments across experimental conditions
 - Similar average personalized adjustment across conditions (95% CI of marginal effect: -0.26 to 0.74)
 - Nearly indistinguishable distribution of personalized adjustments across conditions

Table 9.
Projected Years of Retirement Security by Mode of Initial Enrollment

Initial Enrollment Parameters			Assumed Distribution of Future Market Returns			
Savings Window	Mode	Contribution [%]	Low $\mu=1.6$	Moderate $\mu=3.5$	High $\mu=5.6$	Historic $\mu=6.4$
10 years (start age of 55 years)	Automatic	3.4	3.6	4.1	4.6	4.6
	Personalized	7.8	6.4	7.5	8.1	8.8
			+79%	+84%	+77%	+90%
15 years (start age of 50 years)	Automatic	3.4	6.9	7.5	9.4	10.0
	Personalized	7.8	11.4	14.2	17.3	18.9
			+64%	+89%	+84%	+89%
20 years (start age of 45 years)	Automatic	3.4	11.4	14.2	18.1	19.8
	Personalized	7.8	18.1	24.5	≥ 30.0	≥ 30.0
			+59%	+73%	+66%	+52%
25 years (start age of 40 years)	Automatic	3.4	17.3	23.5	≥ 30.0	≥ 30.0
	Personalized	7.8	27.6	≥ 30.0	≥ 30.0	≥ 30.0
			+60%	+28%	--	--

Notes: This table summarizes the estimated years of retirement security for employee archetypes defined by mode of initial enrollment, the duration of an employee's accumulation period, and the assumed average annual market return. Security estimates reflect the length of an annuity that one could purchase using accumulated post-tax savings that would provide \$864 of monthly income (i.e., the minimal level of income required for retirement security after accounting for Social Security benefits) assuming a 3 percent real rate of return during retirement. Accumulation calculations assume deterministic market returns, a 0.25 annual contribution rate increase up to a cap of 10 percent, a \$50,000 annual salary with a 1 percent real growth rate, a plan match of 50 percent up to a 6 percent limit, a retirement age of 65, and are rounded to the nearest \$5k. Annuity calculations drawn from an online calculator accessed in August 2021: <https://www.bankrate.com/calculators/investing/annuity-calculator.aspx>.

How does the switch to personalized enrollment affect projected years of retirement security?

- Deterministic projections for representative employee (\$50,000 earnings; 1 percent wage growth; 50 percent match up to 6 percent; 75% inertia; 10 percent cap; 65 retirement age)
- Assume marginal-inframarginal equivalence for initial contribution rate

2. Does variation in 401(k) digital design affect initial enrollment and long-run financial security?

- **Yes.** Field experiments across 501 401(k) AE plans indicate that modest visual enhancements to design led to 15% increase in personalized enrollment (from 0.60 to 0.69) and a 13% increase in average savings rate (from 7.28 to 8.26)
- Marginal effect of design on personalized enrollment equivalent to that predicted by a 68% increase in the plan match (or an increase in employee age of 11 years, all else equal)
- Evidence that marginal personalized enrollees increased contributions in a matter equivalent to inframarginal enrollees
- (Also suggestive evidence for marginal – inframarginal equivalence along the second margin of active enrollment)
- Plan match, inertia, and marginal-inframarginal equivalence imply that switch from automatic to personalized enrollment could lead to substantial increase in years of projected retirement security

Design-induced shift from automatic to personalized enrollment could lead to several years of additional retirement security– a larger increase in savings than associated with AE

3. Why do people respond to variation in digital design?

- Third field experiment suggests influence of Enhanced Design driven by colored buttons and standardized language
- In theory, decision based on deliberative comparison of the PV of costs/benefits associated with each option – so potentially design changes shifted beliefs about enrollment
- Economics has noted three frictions commonly invoked in nudge research:
 - (i) Limited attention/recall of decision-relevant information
 - (ii) Confusion or a lack of understanding of available options
 - (iii) Lack of trust in financial institutions

We examined mechanisms underlying response to design w/ online experiments (N = 6,871) involving hypothetical enrollment decisions from interfaces resembling those used in real-life

Test of Behavioral Mechanisms from Lab Studies

Table 8.
Clarifying Decision Mechanisms through Hypothetical Enrollment Experiment

		Potential Decision-Frictions						
		Costs and Benefits associated with Personalized Enrollment			Knowledge of Plan Detail		Confusion	Institutional Trust
		Effort and Time Costs [1-7]	PE Importance [1-7]	Min Contrib to Secure Retirement [%]	Match Recall [1.0]	Default Recall [1.0]	Decision Clarity [1-7]	Trust in Plan [1-7]
Marginal Effect Pr (Personalize = 1)								
Panel A. Enhanced Design [Relative to Baseline]								
Standardization + Headlines + Default	0.08** (0.03)	-0.29** (0.12)	0.08 (0.07)	-0.59 (0.56)	-0.00 (0.03)	0.14*** (0.03)	0.00 (0.07)	0.07 (0.09)
Standardization + Headlines + Default/Match	0.13*** (0.03)	-0.07 (0.11)	0.10 (0.07)	-0.65 (0.64)	0.03 (0.03)	0.07** (0.03)	0.10 (0.07)	0.17* (0.09)
Standardization + Color + Default/Match	0.07* (0.03)	-0.23* (0.12)	0.02 (0.07)	-0.40 (0.55)	0.09*** (0.03)	0.11*** (0.03)	-0.05 (0.07)	0.01 (0.09)
Baseline Mean	0.50	4.17	6.18	8.34	0.70	0.55	3.81	5.20

- We replicated substantive effect of design on personalized enrollment
- Response to design not driven by changes in saving preferences or beliefs about enrollment
- Response to design not driven by cognitive frictions of attention, confusion or trust

Experimental Test of Affect-Based Heuristic

Please select one of the following options:

I want to enroll with different choices. Note: This enrollment will cancel your scheduled automatic enrollment. SELECT	I want to confirm my automatic enrollment. SELECT	I do not want to enroll. SELECT
---	---	---

If you confirm your automatic enrollment you will be enrolled at a savings rate of **3percent**

Please select one of the following options:

Do it Myself I want to personalize my enrollment by selecting a different savings rate or investment option. SELECT	Do it for Me I want my auto enrollment to go through at the savings rate chosen by my employer. SELECT	I Don't Want to Save I want to cancel my auto enrollment and not save at this time. SELECT
---	--	--

Subsequent lab study consistent with possibility enrollment choice governed by affect-based heuristic
(option-specific anxiety predicts choice, design shifts anxiety, anxiety shifts lead to different choices)

4. Are plan administrators aware of the potency of design?

- **No.** Incentivized survey of 401(k) plan sponsors (n = 637) finds that 88 percent underestimated potency of design and only 12 percent could identify most effective design element from 4-option menu.
- Most confident administrators least able to rank-order successful design elements
- Second survey of 80 high-ranking policy, industry and academic stakeholders (2021) indicates low prioritization of design as strategy for increasing saving relative to changes in the match, financial education, and simplification

Digital design can be powerful, scalable, and difficult to predict (but easy to optimize via A/B testing)

Lesson #1

Attend to implications of digital design for consumer protection

- **DX has radically shifted how consumers make decisions** involving health (e.g., health insurance), household finance (e.g., saving, investment), benefit programs, purchasing
 - One industry report forecasts private sector will spend \$6.8 trillion from 2020 to 2023 to integrate digital technology across business functions
 - Mckinsey & Co. estimates 65 percent of consumer interactions already digital
 - BLS projects that growth in the web developer and digital designer job category from 2019 to 2029 will be double the national average (OOH)
- **Design doesn't easily fit taxonomy of existing economic research**
 - Economists interested in choice architecture have documented the importance of defaults, complexity, numerical framing, reminders, and salience across a range of economic decisions
 - T&S define nudges as “any aspect of the choice architecture that alters people’s behavior in a predictable way without forbidding any options or significantly changing their economic incentives.” (Thaler and Sunstein 2008)
 - Theoretically, nudges seen to affect choice by addressing cognitive limits pertaining to self-control, attention, computation, understanding (Datta & Mullainathan 2014) – i.e., facilitates informed, better, decision-making

Lesson #1

Attend to implications of digital design for consumer protection

What is design? Strategic and non-strategic use of visual, textual, social, interactive, gamified elements to influence behavior through hedonic/motivational/addiction channels

- May encompass sludges and “dark patterns” – design that is deliberately intended to frustrate, trick, confuse individuals
- Design may relate to research in marketing, advertising, psychology on gamification, digital engagement, reward-seeking (Chaffey 2007; Baek and Yoo 2018; Seo, et al. 2011)
- Design may not have predictable effects (even by domain experts) and may be hard to avoid – but easy to optimize with A/B testing

Red flags have recently been raised about potential consumer protection risks in high-leverage settings where people may not have well-defined priors about optimal behavior

- Trading platforms (stocks, options, NFTs) (e.g., gamification in Robinhood)
- Decentralized finance (web3 financial products)
- Gambling platforms

What about the risks (and promise) of digital design in traditional financial/health decisions?

Case study: Could natural variation in 401k design across financial providers inadvertently affect average risk of retirement insecurity?

Recall substantial variation in enrollment interface design across financial providers...

Choose your investment path



Do it for me

Use your employer's pre-selected investments, fill in details later.

LET'S GO



Do it myself

You decide all the details regarding your investments.

I GOT THIS

Enroll Now

The ABC Company offers SmartStart Automatic enrollment following 90 days of employment or transfer to an eligible position. If you take no action, you will be enrolled at the Plan's default pre-tax contribution rate (3% of hired, rehired or transferred to an eligible position prior to 7/1/16 or 6% if hired, rehired or transferred to an eligible position on or after 7/1/16) and your contribution rate will be increased annually by 1% until you reach a maximum of 10%. Your contributions will be invested in the Bright Horizon Fund nearest the year in which you will turn age 60.

You may decline SmartStart Automatic Enrollment below. Alternatively, you may enroll in the Savings Plan by choosing your own contribution rate and investment options.

☐ Decline Automatic Enrollment

Or

☐ Change Automatic Enrollment rate

Remember if you take no action you will automatically be enrolled as a smart saver.

Clear Entries

Cancel

Next

Please select one of the following options:

I want to enroll with different choices.

Note: This enrollment will cancel your scheduled automatic enrollment.

SELECT

I want to confirm my automatic enrollment.

SELECT

I do not want to enroll.

SELECT

If you confirm your automatic enrollment you will be enrolled at a savings rate of **3 percent**

Please select one of the following options:

Do it Myself

I want to personalize my enrollment by selecting a different savings rate or investment option.

SELECT

Do it for Me

I want my auto enrollment to go through at the savings rate chosen by my employer.

SELECT

I Don't Want to Save

I want to cancel my auto enrollment and not save at this time.

SELECT

Recall substantial variation in enrollment interface design across financial providers...

Choose your investment path

68%



Do it for me

Use your employer's pre-selected investments, fill in details later.

LET'S GO



Do it myself

You decide all the details regarding your investments.

I GOT THIS

49%

Please select one of the following options:

I want to enroll with different choices.

Note: This enrollment will cancel your scheduled automatic enrollment.

SELECT

I want to confirm my automatic enrollment.

SELECT

I do not want to enroll.

SELECT

Survey of US employees [N = 302, April 2019]

Asked to make hypothetical enrollment decision from experimentally varying interface (3 percent default, 50% match up to 6 percent)

Enroll Now

The ABC Company offers SmartStart Automatic enrollment following 90 days of employment or transfer to an eligible position. If you take no action, you will be enrolled at the Plan's default pre-tax contribution rate (3% of hired, rehired or transferred to an eligible position prior to 7/1/16 or 6% if hired, rehired or transferred to an eligible position on or after 7/1/16) and your contribution rate will be increased annually by 1% until you reach a maximum of 10%. Your contributions will be invested in the Bright Horizon Fund nearest the year in which you will turn age 60.

You may decline SmartStart Automatic Enrollment below. Alternatively, you may enroll in the Savings Plan by choosing your own contribution rate and investment options.

☐ Decline Automatic Enrollment

Or

☐ Change Automatic Enrollment rate

Remember if you take no action you will automatically be enrolled as a smart saver.

Clear Entries

Cancel

Next

78%

If you confirm your automatic enrollment you will be enrolled at a savings rate of 3percent

Please select one of the following options:

Do it Myself

I want to personalize my enrollment by selecting a different savings rate or investment option.

SELECT

Do it for Me

I want my auto enrollment to go through at the savings rate chosen by my employer.

SELECT

I Don't Want to Save

I want to cancel my auto enrollment and not save at this time.

SELECT

Lesson #1

Attend to implications of digital design for consumer protection

We have strict governance of informational and economic structure of 401k plans but little oversight of potentially influential aspects of digital design

Considering possibility that digital design (and other non-economic features of plan administration) may have a large and unappreciated effect on retirement preparedness...

How do we encourage responsible design in context of (401k) retirement plans?

- Extend fiduciary duty to encompass digital plan design under ERISA
- Promote awareness of the potency of design (particularly, relative to traditional economic incentives)
- Encourage promulgation of third-party standards and protocols for design audits
- Shift to structurally less choice-centric saving paradigms (promote further adoption of automatic escalation, allow for higher default rates, move away from defined-contribution models)

Serenity Now, Save Later? Evidence on Retirement Savings Puzzles from a 401(k) Field Experiment (Bhargava and Conell-Price, 2021)

Research examining candidate explanations for retirement saving puzzles among plan-eligible, low-saving, employees (in collaboration with single large US firm)

We test candidate explanations through an online field experiment where we administered incentive- and information-based treatments to 1,137 low-saving employees at a firm with a generous plan match.

Treatments embedded within broader survey intended to assess the employee-specific incidence of the four frictions.

- **Retirement Literacy** - Encompasses both financial literacy and biases in other retirement-relevant beliefs leading employees to underestimate saving needs
- **Plan Confusion** – Confusion about plan details that leads to underestimation of eligibility or the plan match
- **Enrollment Complexity** - Economic and psychological costs associated with administrative enrollment could lead to delayed enrollment
- **Present Focus** – Privileging of immediate relative to delayed flows of consumption utility

Serenity Now, Save Later? Evidence on Retirement Savings Puzzles from a 401(k) Field Experiment

Saurabh Bhargava[†] Lynn Conell-Price[§]

March 2022

Abstract

Economists have advanced several psychological frictions to explain why many 401(k)-eligible employees undersave for retirement despite generous matching incentives. We provide evidence on four of these frictions through a field experiment randomizing undersaving employees to information- and incentive-based treatments linked to a survey assessing each friction's baseline incidence. We describe four main findings: (1) We corroborate prior work showing pervasive deficits in *retirement literacy* and their correlation with saving but reject any meaningful increase in saving from personalized recommendations that demonstrably improve literacy. (2) In an (unplanned) analysis of *plan confusion*, we estimate that 20 to 37 percent of non-participants mistakenly believed themselves to be enrolled—these employees enrolled at high rates when prompted to review their enrollment status. (3) We find no evidence that *enrollment complexity* impedes saving—few employees perceived enrollment as prohibitively time-consuming and simplifying enrollment further did not increase saving. (4) We directly implicate *present focus* as a cause of undersaving by showing that a significant share of employees increased saving in response to a small but immediate microincentive (\$10 gift card) but not to clarification of the dramatically larger, but delayed, plan match. A survey of leading stakeholders suggests that the prescriptions for increasing saving, implied by our findings, depart from those currently prioritized within the industry. Finally, calibrations indicate that a beta-delta model of present bias cannot account for the observed behavior and stated beliefs of employees without assuming implausibly high enrollment disutility. We propose an alternative model of anxiety-based present focus and delayed optimism that does explain our findings—and possibly other retirement savings puzzles—and offers a psychological rationale for reforms that link traditional 401(k) accounts to more liquid accounts (e.g., “Serenity Account”) designed to relieve near-term anxiety.

JEL: D14, D15, D91, G51, J26

[†] Carnegie Mellon University: sbhar@andrew.cmu.edu. [§] Consumer Financial Protection Bureau: lynn.conell-price@cfpb.gov.
Acknowledgments: We thank Linda Bulcock, Karna Basu, John Beshears, Dan Black, David Card, Keith Chen, James Choi, Leah Clark, Carol Conell, Stefano DellaVigna, Ray Fisman, Jonathan Guryan, Karen Huang, Hilary Hoynes, Darius Jones, Ryan Kessler, Botond Köszegi, Howard Kunreuther, David Laibson, Robin Lipp, George Loewenstein, Brigitte Madrian, Ted O'Donoghue, Vikram Pathania, Chris Price, Alex Rees-Jones, Emmanuel Saez, Frank Schallbach, Jesse Shapiro, Justin Sydnor, Lowell Taylor, Oleg Urzitsky, and seminar participants for helpful feedback. We thank Stephanie Rifkin and Cassandra Taylor for excellent project support. The project was funded in part by a research center at the Tepper School of Business and was approved by Carnegie Mellon's Institutional Review Board. The authors retained complete editorial discretion and all views in the paper, as well as any errors, should be attributed to the authors alone and not to their affiliated institutions.

1. Pervasive deficits in retirement literacy, but no evidence that illiteracy impedes saving

- 43 to 47 percent of employees underestimate how much they should save for a secure retirement
- Exposure to personalized saving recommendation did reduce underestimation – but did not lead to increased contributions (a precisely estimated null effect) even for employees with inaccurate beliefs
- Possible explanation: 88 percent of employees recognize that they are undersaving, plan to save more in several months

2. Some employees underestimate the plan match, but such underestimation does not impede saving

- 20 percent of employees underestimated the generosity of the plan's match limit (knowledge of plan eligibility high)
- Experimentally clarifying match did not meaningfully increase savings, even for underestimating employees

3. Potentially substantial confusion about enrollment status – up to 1/3 of non-participants may not be aware of status

4. Evidence for present focus as barrier to 401(k) saving

- 8 to 16 percent of employees saved in response to a \$10 Amazon gift card (many increased contribution by multiple points), but not clarification of larger, but delayed, plan match. Those tagged as present focused in survey 3.5x more responsive to reward
- Response to \$10 implied average (max) gain from the match of \$677 (\$1,583) rest of year and \$2,632 (\$5,383) next calendar year

Lesson #2

Microincentives vs. Disclosures

- **Stakeholders have prioritized plan disclosures, decision-aids, proximal financial education**
 - Education and decision-aids widely adopted by plans, advocated by industry, supported by existing research on financial literacy
 - We find precisely small effect of recommendations on savings – most employees appear to know they are undersaving (despite underestimating by how much)
- **Research also suggests limited responsiveness to increases in plan match**
- **Microincentives (immediate small rewards) may be credible alternative strategy to encourage enrollment, particularly among otherwise unresponsive employees**
 - Plans not currently permitted to use microincentives to encourage plan participation (we technically encouraged people to visit portal and consider saving)
 - SECURE ACT 2.0 includes a provision to permit use of de minimis incentives to encourage participation (may be signed into law later this year)
 - Small rewards have been successfully leveraged in other settings involving public health (vaccine take-up), credit cards, bank accounts, retail subscriptions

Lesson #3

Serenity Accounts

Evidence for present focus not consistent with standard behavioral account of present bias

- We advance new hedonic account in which presence of financial anxiety and delayed optimism regarding future anxiety (i.e., optimism regarding intermediate but not immediate future) could cause otherwise rational employees to delay enrollment
- Hedonic account may explain several empirical retirement puzzles in the literature

Hedonic account highlights need to restructure savings plans to better reflect psychology of saving

- Example: Dual-account plan— such plans would initially direct contributions to liquid buffer account before automatically transferring above-threshold savings to less-liquid account
- Advocated in recent years by academics/policymakers due by concerns over short-term liquidity (Beshears et al. 2015; Gruber 2016; John 2015; Mitchell & Lynne 2017)
- Present research offers psychological rationale for dual-accounts—for many employees, addressing near-term financial anxiety may be a necessary precursor for long-term saving
- Our research implies that psychological design of dual account plans may be important for ensuring engagement (“Serenity Account” rather than “Emergency Savings Account”)

Thank you!

sbhar@andrew.cmu.edu

And thanks to coauthors:

Lynn Conell-Price, CFPB

Rick Mason, Voya Financial

Shlomo Benartzi, Voya Financial & UCLA Anderson