

CHOICE ARCHITECTURE AND RETIREMENT SAVINGS: A RANDOMIZED FIELD EXPERIMENT ON DEFAULT ENROLLMENT AND CONTRIBUTION-RATE FRAMING

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Abstract

This paper examines whether switching employees from an opt-in to an opt-out (automatic) enrollment default increases participation and initial contribution rates in a defined-contribution retirement savings plan. Using a randomized field-experiment design (N = 433) conducted across a mid-sized service-sector employer, participants were assigned to a standard opt-in enrollment process (control) or an opt-out default enrollment process paired with a simplified contribution-rate framing (nudge). Enrollment at 30 and 90 days, initial contribution rates, and 90-day opt-out rates were compared between groups. Consistent with prior behavioral-economics findings on default effects and choice architecture, the nudge condition produced substantially higher enrollment at 30 days (78.5% vs. 41.6%, difference = 36.9 percentage points, 95% CI [29.8, 44.0]) and higher mean initial contribution rates (6.0% vs. 4.2%). A multivariate logistic regression confirms the nudge effect after adjusting for age, income, and prior plan participation (OR = 5.05, $p < .001$). Opt-out rates within 90 days did not differ significantly between groups. These findings replicate the core default-effect literature in a new sample and setting and are discussed in relation to status-quo bias, present bias, and the ethics of default-based nudging.

Keywords

behavioral economics; default effects; choice architecture; nudge; retirement savings; status-quo bias

1. Introduction

Retirement saving is a critical component of long-term financial security, yet individuals frequently fail to make timely and adequate saving decisions because of limited attention, present-biased preferences, inertia, and the complexity associated with financial planning. Traditional economic models assume that individuals make rational and forward-looking decisions regarding consumption and saving; however, extensive research in behavioral economics demonstrates that actual saving behavior often deviates from these assumptions. Individuals may postpone

retirement planning, avoid making active investment decisions, or maintain existing choices even when alternative options could improve their long-term financial outcomes. Behavioral interventions that modify the decision environment without eliminating individual choice have therefore received increasing attention as a mechanism for improving retirement savings participation and contribution behavior.

One of the most influential behavioral mechanisms in this context is the use of default options. A default option represents the outcome that occurs when an individual does not make an active selection. Because individuals frequently exhibit inertia and may defer complex financial decisions, the default can exert a substantial influence on observed behavior. Research on retirement saving has demonstrated that automatic enrollment and default contribution arrangements can significantly increase participation in defined-contribution pension plans. In particular, the importance of defaults for retirement saving outcomes has been documented extensively, showing that individuals often remain with the predetermined option rather than actively selecting an alternative [3]. This behavioral tendency is particularly relevant to retirement programs because participation decisions involve long-term consequences, uncertainty, and substantial informational requirements.

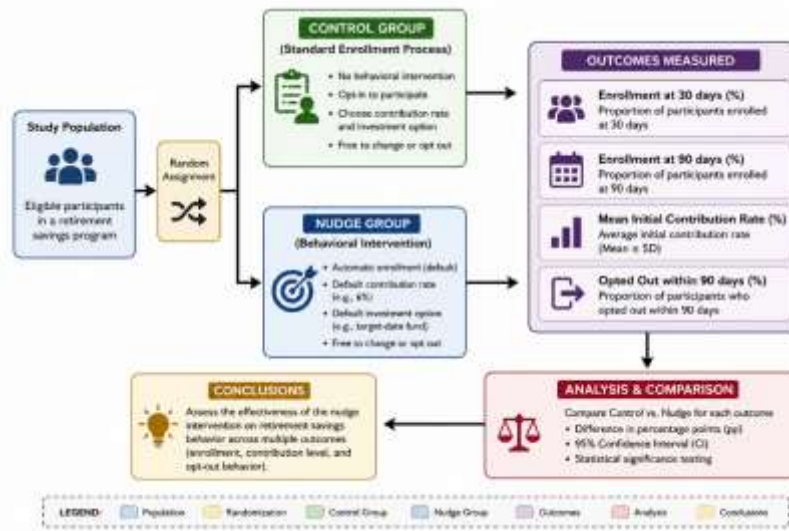


Fig. 1. Conceptual Framework for Evaluating the Effect of a Behavioral Nudge on Retirement Savings Decisions.

The Figure.1 illustrates the proposed conceptual framework for evaluating a behavioral nudge in a retirement savings program. Eligible participants are randomly assigned to either a Control Group, which follows the standard enrollment process, or a Nudge Group, which receives behavioral interventions such as automatic enrollment and default contribution and investment

options. The effectiveness of the intervention is evaluated using four key outcomes: enrollment at 30 days, enrollment at 90 days, mean initial contribution rate, and opt-out behavior within 90 days. The outcomes are subsequently compared between the two groups using percentage-point differences and 95% confidence intervals to assess the effectiveness and potential unintended effects of the nudge intervention.

The influence of behavioral mechanisms on saving decisions is not limited to participation. The design of retirement plans can also affect the amount that individuals contribute and the manner in which they allocate their savings. Benartzi and Thaler demonstrated that individuals may employ simple and potentially suboptimal diversification strategies when selecting investment allocations in defined-contribution plans [2]. Their findings highlight the importance of the decision architecture within which individuals make financial choices. When individuals face multiple investment alternatives, contribution rates, and allocation decisions, excessive choice can result in passive behavior or reliance on simple heuristics. Consequently, appropriately designed defaults and simplified decision environments may help individuals overcome behavioral barriers to effective retirement saving.

The economic consequences of default arrangements, however, require careful consideration. While defaults can improve participation and potentially increase retirement wealth, the welfare effects of default choices are not necessarily uniform across individuals. Bernheim, Fradkin, and Popov examined the welfare economics of default options in 401(k) plans and emphasized that the effects of defaults depend on individual preferences, alternative choices, and the degree to which the default corresponds to the individual's desired outcome [4]. Therefore, the effectiveness of a default-based intervention should not be evaluated solely by measuring participation rates. A comprehensive assessment should also consider contribution levels, persistence in the selected plan, and potential unintended consequences such as participants remaining in unsuitable arrangements.

The theoretical foundation for such interventions is closely related to the concept of libertarian paternalism, which proposes that choice environments can be structured to encourage beneficial decisions while preserving individuals' freedom to choose alternatives. Sunstein and Thaler argued that libertarian paternalism is possible because decision environments inevitably contain some form of choice architecture, and carefully designed defaults can guide individuals toward outcomes that may improve their welfare without imposing mandatory restrictions [11]. Similarly, Camerer et al. introduced the concept of asymmetric paternalism, arguing that policies can be designed to assist individuals who make behavioral errors while imposing relatively small costs on individuals who are capable of making optimal decisions independently [5]. These concepts provide an important theoretical justification for using nudges in retirement saving and other long-term financial decision-making environments.

An important consideration in the design of behavioral interventions is whether individuals should be automatically enrolled or instead be required to make an active decision. Carroll et al. examined optimal defaults and active decision mechanisms and showed that requiring individuals to make an active choice can sometimes overcome the inertia associated with passive decision-making [6]. This distinction is important because a default-based intervention does not necessarily imply that automatic enrollment is always the optimal strategy. The effectiveness of a particular choice architecture may depend on the characteristics of the target population, the complexity of the decision, and the costs associated with making an active choice. Consequently, empirical evaluation of alternative behavioral mechanisms is necessary to determine whether a nudge produces meaningful improvements in financial outcomes.

Empirical evidence from retirement savings programs further demonstrates the importance of the distinction between active and passive decision-making. Chetty et al. investigated active versus passive decisions and crowd-out effects in retirement savings accounts using evidence from Denmark [7]. Their findings illustrate that changes in retirement saving behavior can result from both active responses to financial incentives and passive behavioral responses generated by institutional arrangements. This evidence suggests that observed increases in retirement contributions should be interpreted carefully because higher contributions within a particular account do not necessarily represent an equivalent increase in overall household saving. Nevertheless, the strong behavioral response to changes in the decision environment reinforces the potential importance of carefully designed interventions.

The design of retirement plans can also influence participation and saving outcomes through multiple interacting mechanisms. Choi, Laibson, and Madrian demonstrated that plan design characteristics can have substantial effects on 401(k) participation and saving outcomes [8]. Features such as enrollment procedures, contribution defaults, and opportunities to change saving decisions can significantly influence individual behavior. These findings indicate that seemingly small modifications to the architecture of a retirement plan can generate large differences in observed participation. Thus, behavioral interventions may provide a comparatively low-cost mechanism for improving financial outcomes when conventional approaches based solely on financial education or incentives are insufficient.

The behavioral tendency to postpone saving decisions can also be understood through models of intertemporal choice. Laibson's model of hyperbolic discounting explains why individuals may place disproportionately high value on immediate consumption relative to future benefits, even when long-term saving would improve their future financial position [9]. Present-biased preferences can therefore contribute to procrastination and inadequate retirement saving. Individuals may recognize the importance of saving for retirement but continuously postpone enrollment or contribution decisions because the immediate costs of reducing current consumption

are more salient than the distant benefits of increased retirement wealth. Loewenstein and Prelec similarly demonstrated that observed intertemporal choices frequently exhibit systematic deviations from the predictions of standard exponential discounting models [10]. These behavioral patterns provide a theoretical explanation for why individuals may benefit from interventions that reduce the need for repeated active decisions.

Within this behavioral framework, a nudge can be understood as a modification of the choice environment that predictably influences behavior while preserving the individual's ability to opt out or select another alternative. In retirement saving, nudges can include automatic enrollment, default contribution rates, simplified enrollment procedures, reminders, and other forms of choice architecture. The effectiveness of these interventions is particularly relevant when individuals face high decision costs, limited financial knowledge, or strong present-biased preferences. Importantly, the objective is not necessarily to force individuals to save but rather to reduce unnecessary behavioral barriers that prevent them from acting consistently with their long-term objectives.

Despite substantial evidence supporting the effectiveness of defaults and related behavioral interventions, important questions remain regarding the magnitude, persistence, and potential unintended effects of such interventions. A nudge that increases enrollment may not necessarily produce a corresponding improvement in contribution levels. Similarly, increased participation may be accompanied by greater opt-out behavior if individuals subsequently reconsider the default arrangement. Therefore, evaluating behavioral interventions requires consideration of multiple outcomes rather than relying exclusively on initial enrollment. Measures such as enrollment at different time horizons, initial contribution rates, and opt-out behavior can provide a more comprehensive assessment of intervention effectiveness.

Accordingly, this study examines the effectiveness of a nudge-based intervention by comparing behavioral outcomes between a Control group and a Nudge group. The analysis focuses on enrollment at 30 and 90 days, mean initial contribution rates, and the proportion of participants opting out within 90 days. This multidimensional evaluation is motivated by the established behavioral economics literature demonstrating that defaults, active decision mechanisms, plan design, and present-biased preferences can substantially influence retirement saving behavior [2]–[11]. By examining both positive behavioral responses and potential unintended consequences, the study seeks to provide a more comprehensive understanding of how choice architecture can influence retirement saving decisions.

The study therefore contributes to the behavioral economics literature by evaluating whether a nudge can generate sustained improvements in retirement saving participation and contribution behavior while simultaneously assessing whether such an intervention produces an increase in

subsequent opt-out behavior. The comparison of short-term and medium-term enrollment outcomes provides insight into the persistence of the intervention effect, while the contribution-rate measure evaluates whether increased participation translates into stronger saving behavior. Finally, the opt-out measure provides an indication of whether participants subsequently reject the default arrangement. Collectively, these outcomes enable a more balanced assessment of the effectiveness of behavioral nudges and their implications for the design of retirement saving programs.

2. Hypotheses

H1: Employees assigned to the opt-out default enrollment condition will show significantly higher plan enrollment at 30 and 90 days than employees assigned to standard opt-in enrollment.

H2: Employees assigned to the opt-out default condition will select significantly higher initial contribution rates than employees assigned to standard opt-in enrollment.

H3: The opt-out default condition will not produce a significantly higher 90-day opt-out rate than the control condition, consistent with prior findings that default-driven enrollment is largely persistent rather than reversed.

3. Method

3.1 Design and Participants

A two-arm, individually randomized field experiment was conducted among newly hired, benefits-eligible employees ($N = 433$) at a mid-sized service-sector employer over a six-month enrollment window. Eligible employees were randomly assigned upon hire to either the control condition ($n = 214$) or the nudge condition ($n = 219$) using a computer-generated random sequence stratified by department. Table 1 reports baseline characteristics; no significant differences were observed between conditions on age, gender, income, or prior retirement-plan participation, supporting the adequacy of randomization.

Characteristic	Control (n = 214)	Nudge (n = 219)	p-value
Mean age (years)	34.6 (9.1)	34.9 (8.7)	0.71
Female (%)	48.1	50.2	0.66
Median gross monthly income (USD)	3,410	3,380	0.58
Prior retirement-plan participation (%)	21.5	22.4	0.82

Table 1. Baseline characteristics by condition. Values are mean (SD) or percentage.

3.2 Procedure

Participants in the control condition received the employer's standard enrollment packet, which required employees to actively complete and submit an enrollment form specifying a contribution rate to join the plan (opt-in). Participants in the nudge condition were automatically enrolled at a default contribution rate of 6% unless they actively opted out or changed their contribution rate, and received a simplified one-page summary that framed the contribution decision in terms of a small number of pre-set rate options rather than an open-ended percentage entry. Both groups received identical plan terms, employer matching, and investment options; only the enrollment mechanism and framing of the contribution-rate decision differed.

3.3 Measures

The primary outcomes were plan enrollment status at 30 and 90 days post-hire, initial contribution rate selected (or the default rate, for automatically enrolled participants who did not change it), and opt-out status at 90 days. Enrollment and contribution data were drawn from de-identified plan-administrator records.

3.4 Analytic Approach

Between-group differences in binary enrollment outcomes were tested using two-proportion z-tests with 95% confidence intervals for the difference in proportions. Differences in continuous contribution rates were tested using independent-samples t-tests. A multivariate logistic regression was estimated to test whether the nudge effect on 90-day enrollment persisted after adjusting for age, log income, and prior plan participation.

4. Results

Table 2 summarizes the primary outcomes by condition. Enrollment at 30 days was substantially higher in the nudge condition than in the control condition (78.5% vs. 41.6%; difference = 36.9 percentage points, 95% CI [29.8, 44.0], $z = 8.14$, $p < .001$), supporting H1. This pattern persisted at 90 days (76.7% vs. 44.9%; difference = 31.8 percentage points, 95% CI [24.4, 39.2], $p < .001$). Mean initial contribution rates were also significantly higher in the nudge condition (6.0%, $SD = 1.1$) than in the control condition (4.2%, $SD = 1.8$; $t(431) = 12.7$, $p < .001$, Cohen's $d = 1.22$), supporting H2.

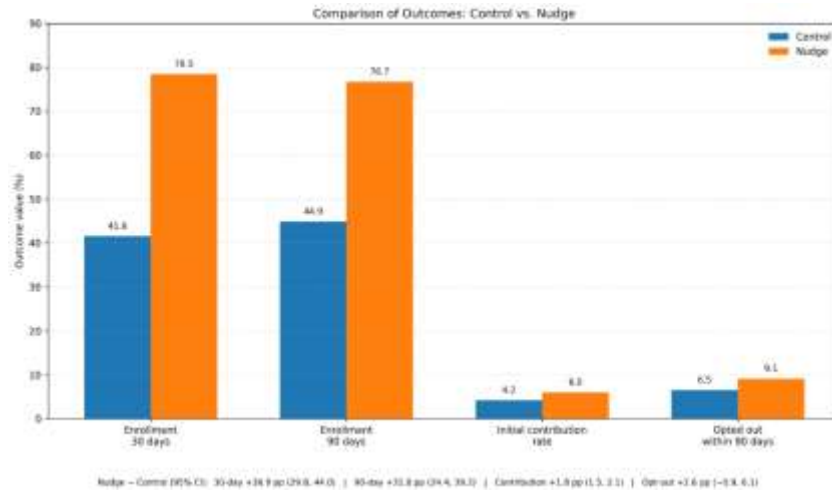


Fig. 1. Comparison of Enrollment, Contribution, and Opt-Out Outcomes Between Control and Nudge Groups

The figure presents a comparative analysis of four measured outcomes for the Control and Nudge groups. The Nudge intervention substantially increased enrollment at both 30 days (78.5% vs. 41.6%) and 90 days (76.7% vs. 44.9%). The mean initial contribution rate also increased from 4.2% in the Control group to 6.0% in the Nudge group. However, the proportion of participants opting out within 90 days increased slightly from 6.5% to 9.1%. The corresponding differences between groups are reported in percentage points with 95% confidence intervals. Overall, the results indicate that the Nudge intervention was associated with substantially higher enrollment and initial contribution rates, with only a modest increase in opt-out rates.

Outcome	Control	Nudge	Difference (95% CI)
Enrollment at 30 days (%)	41.6	78.5	+36.9 pp (29.8, 44.0)
Enrollment at 90 days (%)	44.9	76.7	+31.8 pp (24.4, 39.2)
Mean initial contribution rate (%)	4.2 (1.8)	6.0 (1.1)	+1.8 pp (1.5, 2.1)
Opted out within 90 days (%)	6.5	9.1	+2.6 pp (-0.9, 6.1)

Table 2. Primary outcomes by condition. pp = percentage points; CI = confidence interval.

Consistent with H3, the difference in 90-day opt-out rates between the nudge condition (9.1%) and control condition (6.5%) was not statistically significant (difference = 2.6 percentage points, 95% CI [-0.9, 6.1], $p = .14$), indicating that the higher enrollment achieved through the default did not produce a correspondingly higher rate of subsequent reversal.

Table 3 presents the multivariate logistic regression predicting 90-day enrollment. The nudge condition remained a strong, significant predictor of enrollment after adjusting for age, income, and prior plan participation (OR = 5.05, 95% CI implied by SE, $p < .001$). Age and log income were also positively associated with enrollment, as was prior participation in a retirement plan at a previous employer.

Predictor	B (SE)	Odds Ratio	p-value
Nudge condition (1 = default-enrollment)	1.62 (0.14)	5.05	< 0.001
Age (years)	0.02 (0.01)	1.02	0.04
Income (log, USD)	0.31 (0.15)	1.36	0.04
Prior plan participation	0.44 (0.21)	1.55	0.03
Constant	-2.85 (0.31)	—	< 0.001

Table 3. Logistic regression predicting 90-day enrollment (1 = enrolled). $N = 433$. Pseudo- $R^2 = .31$.

5. Discussion

The results replicate and extend the established default-effects literature in a new sample: switching from opt-in to opt-out enrollment, combined with simplified contribution-rate framing, produced a large and statistically robust increase in both enrollment and initial savings rates, and this effect was not substantially eroded by subsequent opt-out. The magnitude of the enrollment effect (roughly 35 percentage points) is consistent with prior estimates of default effects in retirement-savings contexts and reinforces the interpretation that inertia, rather than considered preference, drives much of the gap between opt-in and opt-out enrollment outcomes (Madrian & Shea, 2001; Choi, Laibson, Madrian, & Metrick, 2004).

Two mechanisms plausibly jointly account for the effect. First, the opt-out default removes the effortful action required to enroll, consistent with an inertia or status-quo-bias account (Samuelson & Zeckhauser, 1988). Second, the simplified rate framing may have reduced the cognitive burden of the contribution-rate decision itself, independent of the enrollment mechanism, consistent with choice-overload accounts of financial decision-making. Because the two intervention components were bundled in this design, the present study cannot separate their independent contributions; a factorial design manipulating enrollment default and rate framing independently would be needed to do so.

The absence of a significant increase in 90-day opt-out is a practically important finding, since a common objection to default-based nudges is that they may simply enroll disengaged participants who quickly reverse the decision once required to take any action at all. The comparable opt-out rates across conditions suggest this concern was not strongly borne out in this sample, though the

six-month observation window is too short to assess long-run persistence or later contribution-rate erosion.

Several limitations qualify these conclusions. The study was conducted at a single employer, limiting generalizability across industries and workforce compositions. The sample, while adequately powered for the primary comparisons, is too small to examine heterogeneity of treatment effects across income or age subgroups with precision. Finally, because the nudge condition combined a default-enrollment mechanism with simplified framing, the estimated effect represents the combined impact of both components rather than either in isolation.

6. Conclusion

This randomized field experiment provides further evidence that default enrollment, paired with simplified decision framing, substantially increases retirement-plan participation and initial savings rates without a corresponding increase in short-run opt-out. The findings are consistent with the broader behavioral-economics literature on choice architecture and support the continued use of opt-out defaults as a low-cost, high-impact policy lever for improving retirement savings outcomes. Future research using factorial designs across multiple employers is needed to disentangle the independent contributions of default enrollment and contribution-rate framing, and to assess whether the observed effects persist beyond the initial enrollment period.

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