

Automatic Enrollment, Opt-Out, and Optimal Default Design with Competing Frictions

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October 16, 2026

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Setting the Stage

- ▶ **Automatic enrollment** in employer-sponsored retirement plans (ESRPs) is the canonical application of **default options** in economic policy.
- ▶ **What we know:** automatic enrollment increases participation and saving in the short run.
- ▶ **What remains unresolved:**
 - ▶ **Inconsistent evidence** on longer-run saving effects when studying ESRPs.
→ (Derby, Mackie, and Mortenson, 2023); (Choi et al., 2024); (Choukhmane, 2025)
 - ▶ **Disagreement about behavior** underlying default effects.
→ Should policy promote active choice or default adherence (Goldin and Reck, 2022)?
- ▶ **A missing margin in this debate:**
 - ▶ Opting out of the default does *not* always imply fully optimized active choice.

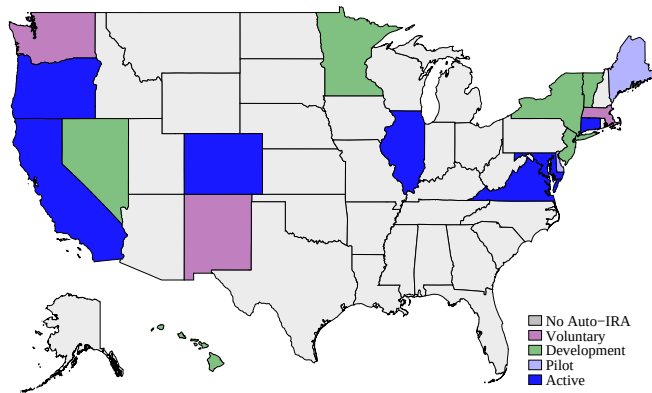
This Paper

Contributions

Why Study Auto-IRAs

- ▶ **Goal:** use state auto-IRAs as a clean setting to study default effects **without assuming** that opt-out implies full **active choice**.
 - ▶ **Q1:** How does automatic enrollment in auto-IRAs affect **retirement savings accumulation**?
 - ▶ **Q2:** What **positive model of behavior** explains default effects in this setting?
 - ▶ **Q3:** What does this **positive model** tell us about **default design**?
- ▶ **Main findings:**
 1. Auto-IRAs generate **persistent increases** in saving, with **withdrawals not eroding** these gains over a long horizon $\implies$ **attenuation** in ESRP setting **does not extend** to auto-IRAs.
 2. Behavior is best explained by a **multi-friction model** with individuals incurring frictional costs both when moving from the default and zero saving.
 3. Model-implied **optimal default rate is low and stable** across behavioral interpretations; policies that **maximize opt-out** (punishment defaults) are not preferred.

State Auto-IRA Programs



- ▶ State **auto-IRA** programs:
 1. Cover workers without access to an **employer-sponsored retirement plan**.
 2. **Automatically enroll** workers at a default contribution rate into a **Roth IRA**.
 3. Workers may **opt out**, change contributions, or withdraw funds at any time.
- ▶ Several programs also implement **automatic escalation** features.

Research Question 1: How do Auto-IRAs Affect Retirement Savings Accumulation?

Data and Methods

Summary Statistics

Findings in Literature

- **Baseline Data:** linked employee-employer data covering the populations of five state.

Restrict to **single-firm-employed**, working age individuals from 2014–2022.

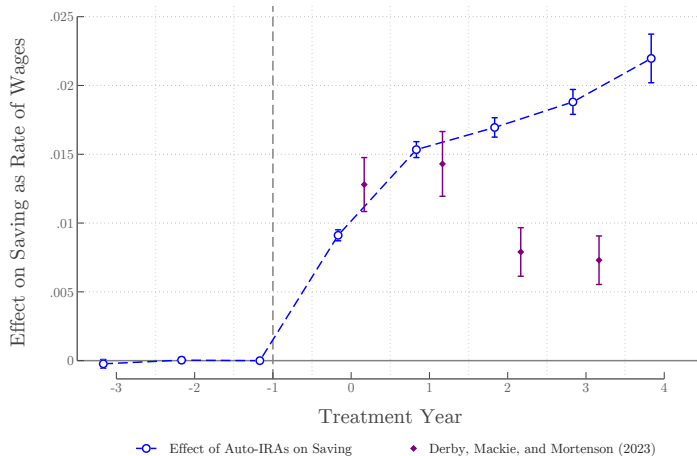
1. **Form W-2:** earnings and employer information.
2. **Form 5500:** Firm-level ESRP information.
3. **Form 5498:** IRA contributions and fair market values.
4. **Form 1099-R:** IRA distributions.

- **Empirical model:**

$$y_{i,t} = \underbrace{\sum_{k=-3}^4 \lambda_k T_{J(i,t),t,k}}_{\text{Treatment effect}} + \underbrace{\theta_i}_{\text{Individual FEs}} + \underbrace{\psi_{J(i,t)}}_{\text{Firm FEs}} + \underbrace{\delta_t}_{\text{Year FEs}} + \underbrace{A_{i,t}\pi}_{\text{Age Profile}} + \underbrace{w_{i,t}\beta}_{\text{Earnings Effect}} + \underbrace{\varepsilon_{i,t}}_{\text{Composite Error}}$$

- **Assumptions:** conditional random mobility (“CRM”) and conditional parallel trends (“CPT”).

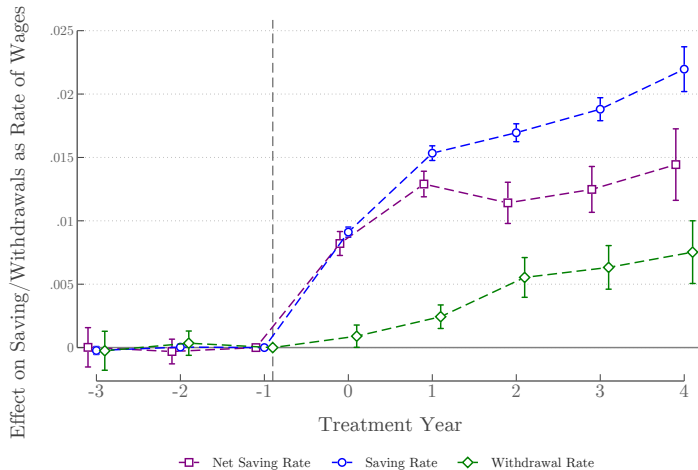
Finding 1: Auto-IRAs Increase IRA Saving over a Five-Year Window



- ▶ **Extensive Margin**
- ▶ **Event study:** years since auto-IRA enrollment.
- ▶ IRA saving rates rise steadily through the fourth treatment year.
- ▶ In contrast to auto-ESRPs, effects do **not attenuate** over this horizon.

Finding 3: Auto-IRAs Only Modestly Increase Withdrawals

Age Breakout



- **Event study:** saving, withdrawals, and net saving.
- Withdrawals increase mechanically with balances, but only modestly.
- Net saving rises through the fourth treatment year.

Finding 4: After Leaving Treatment, Affected Savers do not Exhibit Additional Dissaving

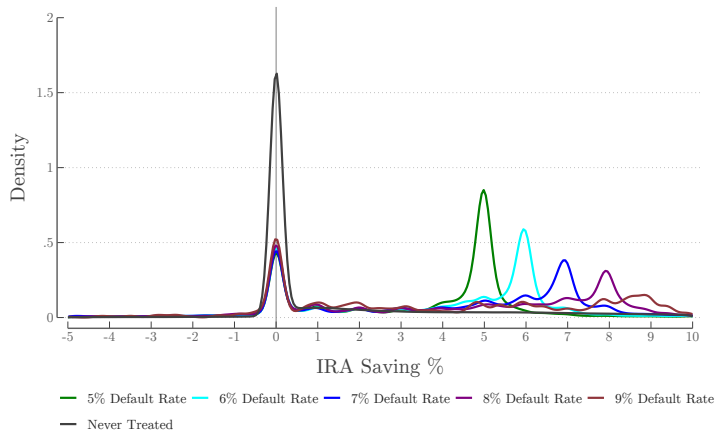
Income Heterogeneity

	Saving Rate	Withdrawal Rate	1{Saving}
<u>Post-Treatment Behavior:</u>			
Treated	0.0131*** (0.0003)	0.0028*** (0.0004)	0.238*** (0.004)
Post Treatment	0.0037*** (0.0006)	0.0037*** (0.0014)	0.032*** (0.0051)

- ▶ Saving and withdrawals both remain **elevated** after leaving treatment.
- ▶ Net saving does not decline post-treatment.
- ▶ Suggests auto-IRAs generate **persistent increases** in retirement saving.

Q2: What Model of Behavior Best Captures Auto-IRAs' Default Effects?

Descriptive Evidence: Density of Saving Rates Given Positive Balances



Gaussian kernel --- Bandwidth = 0.15

- ▶ Sample: individuals with **positive** IRA balances.
- ▶ Bunching persists at the **default** and at **non-saving**.
- ▶ Bunching at zero net IRA saving visible even when not a mechanical corner.

Descriptive Evidence: Behavior as Default Increases

Probability of Following the Default Rate or IRA Inactivity by
Default Rate

Default Rate	<u>Saving Choices</u>		
	Default Rate Saving	IRA Inactivity	Active Saving
5%	64.4%	1.8%	33.8%
6%	53.2%	4.0%	42.8%
7%	41.7%	6.8%	51.5%
8%	35.9%	9.8%	54.4%
9%	26.0%	18.2%	55.8%

- **Table:** Behavior as default rate increases given initial adherence.
- Active choice **increases**.
- IRA inactivity (zero saving and withdrawals) **increases**.

Empirical Test: Responses to Higher Defaults

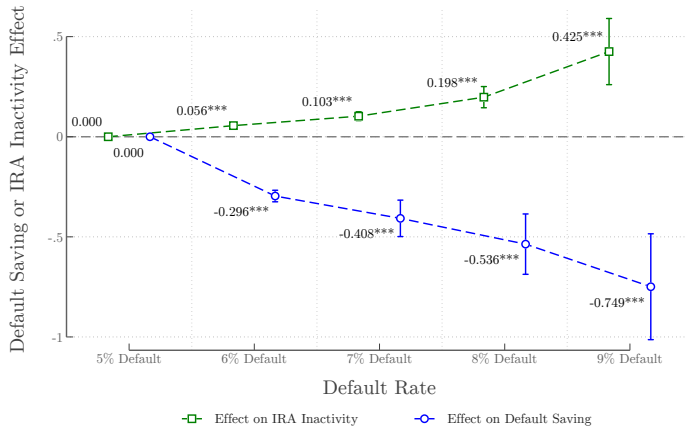
What to Expect

- ▶ **Key question:** Do higher default rates move workers out of default saving and into IRA inactivity?
- ▶ **Sample:** Auto-IRA enrollees who initially followed the 5% default rate.

$$y_{i,t} = \sum_{k=5}^9 \gamma_k \mathbf{1}\{\widehat{\text{Default Rate}}_{i,t} = k\} + \sum_{\ell=-3}^4 \lambda_{\ell} T_{J(i,t),t,\ell} + \theta_i + \delta_t + X_{i,t}\beta + \varepsilon_{i,t}$$

- ▶ **Outcomes:** Indicators for default adherence and IRA inactivity (zero contributions and zero withdrawals).
- ▶ **Coefficients of interest:** $\gamma_k - \gamma_5$ measure changes in each outcome relative to the 5% default, controlling for enrollment duration, individual and year effects, and covariates.
- ▶ **Identifying variation:** Differences in escalation rollout and eligibility rules generate default-rate variation among workers with similar enrollment durations.

Higher Defaults Reduce Default Saving and Increase IRA Inactivity



$p < 0.1$, * $p < 0.05$, ** $p < 0.01$, ***

- Effects relative to the **5% default**, among workers who initially followed that default.
- Roughly **57%** of the induced decline in default saving **offset** by increased IRA inactivity.
- Higher defaults move some into **zero contributions and zero withdrawals**.

Interpreting Bunching at IRA Inactivity

1. Binding non-negativity constraint

- ▶ Bunching persists among individuals with positive Roth balances.

2. Kink or notch in the choice set

- ▶ Available Roth basis permits tax- and penalty-free withdrawals.

3. An atom in preferred saving rates at zero

- ▶ A fixed preference for zero does not naturally explain movement into inactivity as defaults rise.
- ▶ A discrete utility premium for zero is choice-equivalent to a friction.

4. A friction associated with nonzero saving

- ▶ Can explain both bunching and responses to higher defaults.
- ▶ May reflect real costs, behavioral forces, or a preference for inactivity.

Q3: What does this Interpretation tell us about Default Policy?

What Existing Theory Says About Optimal Defaults

- ▶ Leading results in the optimal defaults literature:
 - ▶ Goldin and Reck (2022) Bernheim and Gastell-Mueller (2024)
 - ▶ **Single friction-preferred choice** (the default).
- ▶ Core policy implication in these models:
 - ▶ If frictions are **sufficiently normative** $\Rightarrow$ set an **attractive default**.
 - ▶ If frictions are **behavioral** $\Rightarrow$ set a **punishment default**.
- ▶ **What these models rule out by construction:**
 - ▶ Any other **friction-preferred alternative** to active choice (e.g. non-saving).
- ▶ **This paper:**
 - ▶ Introduces a second friction-preferred choice.
 - ▶ Shows the attractive-vs.-punishment dichotomy breaks down.

Estimating the Model

Quantitative Model

Parameter-Specific Identification

Model Moments

► Key objects to estimate:

1. Individuals choose a saving rate:

- Default rate: d .
- Non-saving: $z = 0$.
- Active alternatives.

2. Model parameters:

- Distribution under active choice.
- Friction to opting out of default.
- Friction to opting out of non-saving.

3. Simulated method of moments:

- Matches bunching.
- Matches shares of active saving.

► Maximization Problem:

$$(x_i, y_i) = \arg \max_{(x_i, y_i)} \left\{ \omega_i \ln(x_i + \alpha) + \ln(y_i) - \varphi_i^d \mathbf{1}\{x_i = d\} - \varphi_i^z \mathbf{1}\{x_i = z\} \right\}$$

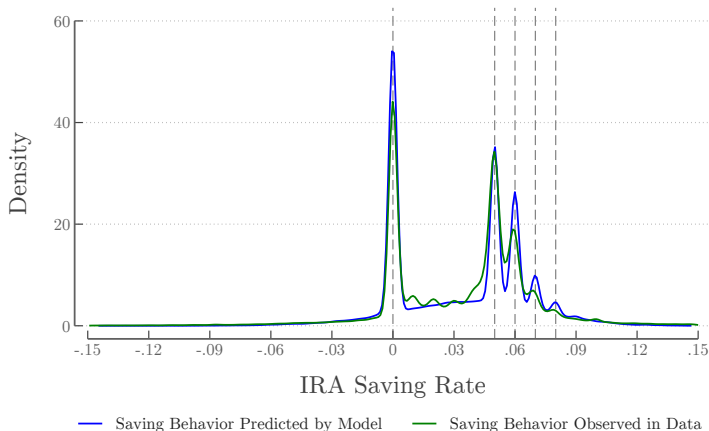
$$y_i = 1 - x_i, \quad \underline{x}_i \leq x_i \leq \bar{x}_i$$

► Frictions:

$$F(\varphi_i^j) = \begin{cases} 0 & , \varphi_i^j < 0 \\ \xi + \left[(1 - \xi) \left(1 - \exp \left(-\frac{\varphi_i^j}{\rho_2^j} \right) \right) \right] & , \varphi_i^j \geq 0 \end{cases}$$

► Weighting: $\omega_i = \max\{0, \bar{\omega}\}, \bar{\omega} \sim N(\mu_\omega, \sigma_\omega^2)$

Goodness-of-Fit



Gaussian kernel, bandwidth = 0.002

- **Figure:** saving-rate distribution in the **model** vs. **data**.
- Model-generated distribution is *close* to data.
- Yearly friction **magnitudes:** \$200–\$300.

Estimation Results: Small but Behaviorally Meaningful Frictions

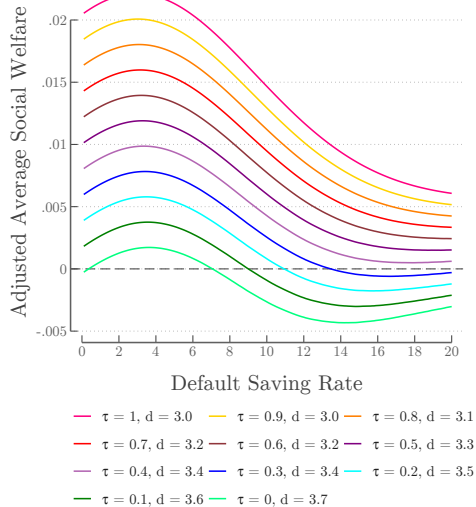
	Identity Weighting Matrix	Optimal Weighting Matrix
As Percent of Wages:		
Default Rate Friction	0.543% (0.046%)	0.870% (0.100%)
IRA Inactivity Friction	0.519% (0.042%)	0.833% (0.068%)
In Dollars for Median Enrollee:		
Default Rate Friction	\$199.0 (\$17.0)	\$318.8 (\$33.3)
Non-Saving Friction	\$190.2 (\$15.3)	\$305.5 (\$22.5)

► Ages 20–34

► Ages 35–49

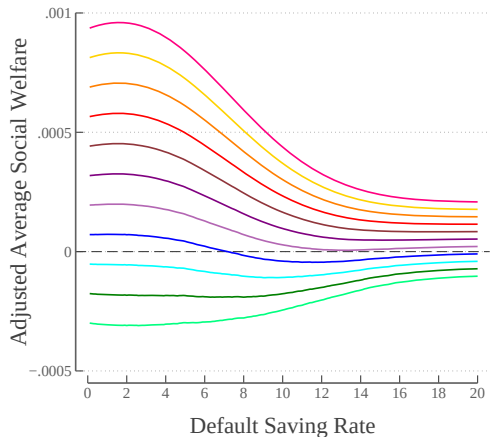
► Ages 50–59

► Parameters



Optimal Defaults under Normative Ambiguity

- **Figure:** optimal default rate by normativity of frictions.
 - $\tau = 1 \Rightarrow$ frictions reflect real costs.
 - $\tau = 0 \Rightarrow$ frictions reflect biases.
- Zero corresponds to welfare under a **punishment default** (i.e., forced opt-out).
 - Positive values $\Rightarrow$ interior defaults increase welfare.
- Optimal default between **3.0% and 3.7%.**
- Similar results by age. Age-Specific Results



Counterfactual: Removing the Non-Saving Friction

- ▶ Without the non-saving friction, classic single-friction logic re-emerges.
- ▶ When frictions are behavioral, punishment defaults become optimal.
- ▶ Highlights the importance of **displacement** between friction-preferred choices.

1. Question 1: How do auto-IRAs affect retirement **savings accumulation**?

- ▶ **Answer:** Auto-IRAs increase retirement savings over the medium-term, no erosion after job separation.
- ▶ Results suggest **increased savings** accumulation over the **lifecycle**.

2. Question 2: What **positive model** best captures behavior in the auto-IRA setting?

- ▶ **Frictional model** with frictions associated with **non-saving** and **default saving**.

3. Question 3: What does this positive model tell us about **optimal default** policy?

- ▶ **Low-positive** default rates, even if default effects reflect behavioral biases.
 - ▶ In this case, the default rate is a **second best** instrument which addresses other distortions to saving.
-
- ▶ Potential for other interactions between multiple friction-preferred choices in other settings.

Bonus

1. Additional Work on Auto-IRAs

2. Asymmetric Normativity

3. Additional Detail on Conclusions

4. Optimal Defaults with Internalities

5. Sensitivity Matrix

6. How the Data Discipline the Model

7. Robustness and Identification

8. Anchoring vs. Bunching

- ▶ Thank you so much for your time!
- ▶ Feel free to contact me with questions:
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References

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Contributions

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► Three main contributions:

- 1. Lifecycle effects of automatic enrollment:** [Madrian and Shea \(2001\)](#); [Derby, Mackie, and Mortenson \(2023\)](#); [Friedberg, Leive, and Cai \(2023\)](#); and [Choukhmane \(2025\)](#)
→ **Contribution:** Auto-IRAs increase lifecycle savings accumulation, where auto-ESRPs do not, likely because of the institutional environment.
- 2. Frictional models of saving:** [Carroll et al. \(2009\)](#) and [Choukhmane \(2025\)](#).
→ **Contribution:** Non-saving represents an account-level friction-preferred choice $\implies$ multi-friction model.
→ **Contribution:** Relatively small frictional estimates with realistic constraints.
- 3. Optimal default policy:** [Goldin and Reck \(2022\)](#) and [Bernheim and Mueller-Gastell \(2024\)](#)
→ **Contribution:** Rule out policies that maximize active choice as optimal. Optimal policy: low-positive default rates.

Data Benefits of Studying Auto-IRAs

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- ▶ Auto-IRAs allow direct observation of:
 1. Employee saving (IRA contributions from Form 5498).
 2. Employee withdrawals (IRA distributions from Form 1099-R).
 3. IRA account balances and wealth accumulation (Form 5498).
- ▶ Enable construction of longitudinal linked employee–employer data covering earnings, saving, withdrawals, and wealth in five early-adopting states.
- ▶ Allows identification of individuals for whom a zero saving rate is an **interior choice** from those facing a **binding constraint**.
 - ⇒ This distinction is important for identifying behavior rather than mechanical outcomes.

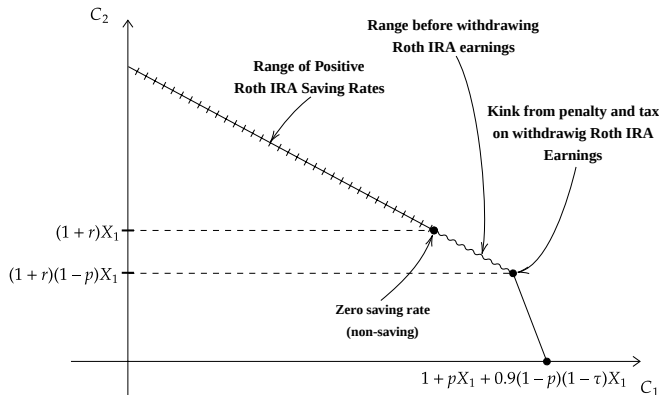
Why Auto-IRAs Are a Clean Setting

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- ▶ **Relative to ESRPs**, auto-IRAs abstract from institutional features that complicate interpretation of default effects:
 1. Accounts are fully **portable** across jobs.
 2. No employer matching, vesting schedules, non-discrimination testing, or required distributions.
 3. ESRPs bundle defaults with employer incentives and tax design; auto-IRAs are designed primarily to facilitate **savings accumulation**.
- ▶ This institutional simplicity enables **cleaner identification** of automatic enrollment's effect on saving behavior.
- ▶ Roth IRAs are at least **partially liquid** vehicles.

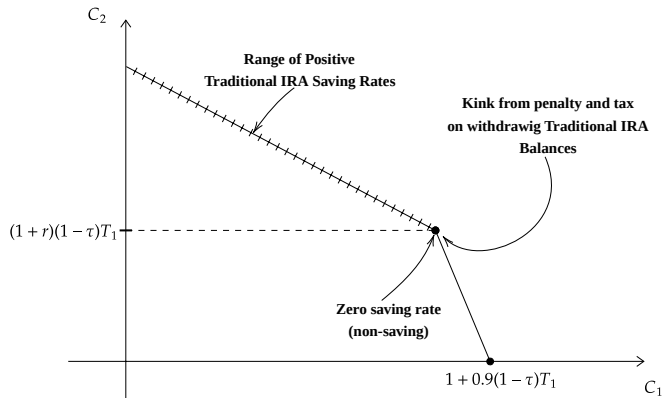
Institutional Benefits of Auto-IRAs – Roth IRA Budget Constraint

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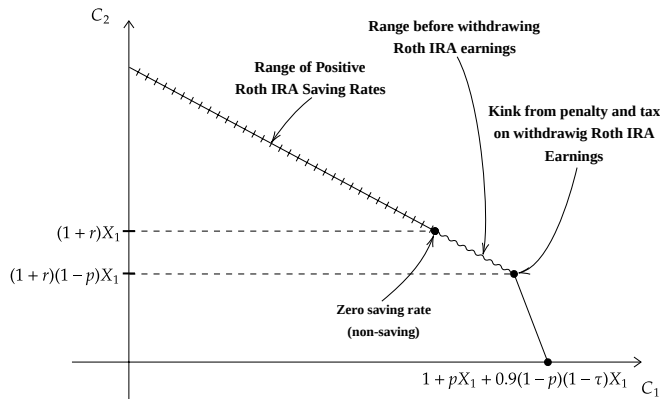
- ▶ Two-period framework.
- ▶ Agents enter period 1 with X_1 in **Roth IRA assets.**
 - ▶ A fraction p represents prior contributions (not earnings).
- ▶ Roth IRA contributions can be **withdrawn penalty- and tax-free.**

Institutional Benefits of Auto-IRAs – Traditional IRA Budget Constraint

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- ▶ Two-period framework.
- ▶ Agents enter period 1 with T_1 in **traditional IRA assets**.
- ▶ Penalties and taxes generate a **kink at non-saving** in the withdrawal region.

Assumptions for a Smooth Roth IRA Saving Distribution

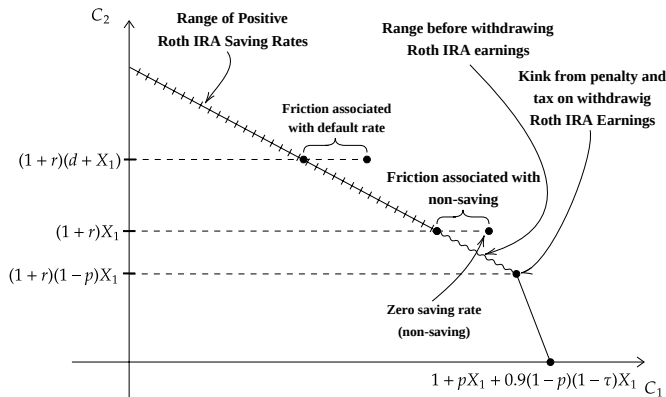
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► In standard neoclassical models, given Roth IRA rules, smooth saving rates arise if:

1. The marginal distributions of Roth balances are **continuous**, and
- 2a. Policy function level sets are **countable**, or
- 2b. Saving rates associated with uncountable level sets are **continuously distributed**.

Candidate Roth IRA Budget Constraint with Behavior

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- **Bunching** at both the default rate and zero saving.

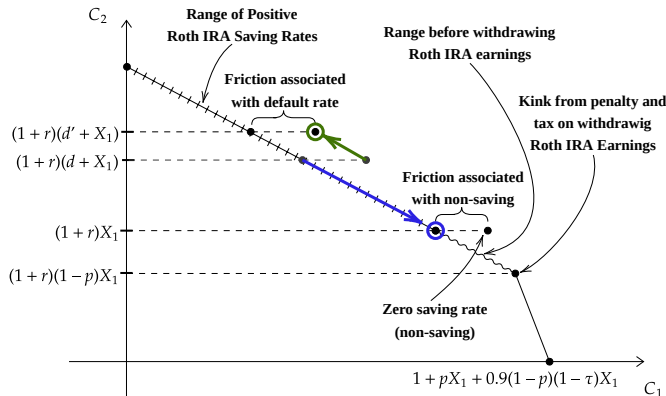
⇒ Interpreting this behavior requires frictions for:

1. deviating from the **default rate**.
2. deviating from **non-saving**.

- Motivates a framework with **multiple frictional-preferred choices**, default and non-saving.

Increasing the Default Rate $\Rightarrow$ More Non-Saving

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- Given this model, we expect increasing the default rate to:
 1. Induce more active choice.
 2. Induce more non-saving.
- This generates a **policy tradeoff**
 - **Too high** of default rates could have undesirable effects by leading many to **opt out of saving** entirely.

Findings from Literature Studying Auto-ESRPs

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► Three empirical main findings:

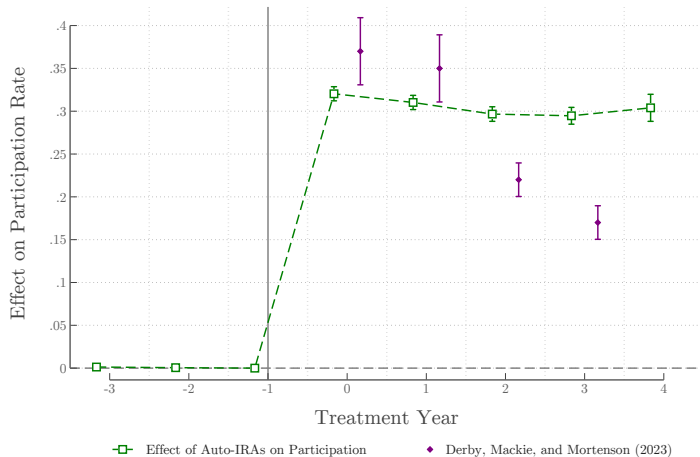
1. Automatic enrollment has large initial impacts on saving and participation ([Derby, Mackie, and Mortenson, 2023](#)).
2. The effect of **automatic enrollment** in an ESRP **attenuates** in the medium-term ([Choukhmane, 2025](#)).
3. After exiting enrollment (*i.e.*, changing jobs), individuals tend to **withdraw** the savings they accumulated under the **ESRP automatic enrollment** policies ([Beshears et al., 2022](#)).

Summary Statistics

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	Control Group	Pre-Treatment	Currently Treated	Post-Treatment
Observations	68,916,416	2,103,146	1,352,630	123,278
Mean Wages	\$87,300	\$54,400	\$46,500	\$66,500
Mean Age	39.3	38.2	38.6	39.0
% Saving in IRAs	6.3%	5.4%	30.8%	6.6%
% > 0 IRA FMV	20.7%	13.2%	36.0%	27.7%
Mean IRA Saving (Rate)	0.5%	0.5%	1.4%	0.5%
Mean IRA Saving (Gross)	\$311	\$255	\$531	\$256
Mean IRA Withdrawals (Rate)	0.8%	0.4%	0.7%	0.7%
Mean IRA Withdrawals (Gross)	\$389	\$172	\$214	\$263

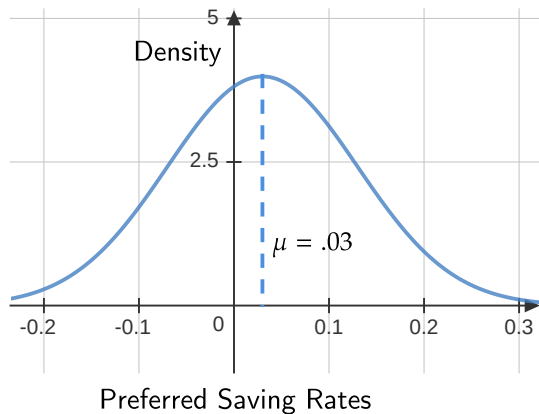
Finding 2: Auto-IRAs Increase Participation over a Five-Year Window



- **Event study:** effect on the extensive margin of saving.
- Participation effects are **durable** through at least four years.
- Auto-IRAs primarily draw new savers into the system.

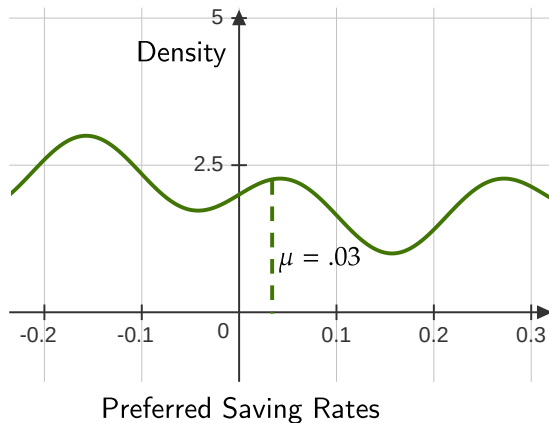
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Literature on Optimal Defaults: (Goldin and Reck, 2022)

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- ▶ **Single friction model.**
- ▶ Optimal to maximize **opt-in** to default if:
 1. Preferences and preferred saving rates follow a symmetric and single-peaked function or distribution.
 2. Perceived costs distributed independent of preferred saving rates.
 3. Perceived costs are sufficiently normative.
- ▶ If (1) and (2) hold but not (3), then maximize active choice (punishment default).

Literature on Optimal Defaults: (Bernheim and Mueller-Gastell, 2024)



► Main Slides

- Single friction model.
- **Approximately** optimal to maximize **opt-in** to default if:
 1. Perceived costs, preferred saving rates, biases, and utility curvature parameters are distributed independently.
 2. Perceived costs are sufficiently normative.
- If (1) holds but not (2), then maximize active choice (punishment default).

Why Estimation Is Necessary

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- ▶ With two friction-preferred choices, theory alone delivers **ambiguous** policy predictions.
- ▶ Optimal policy depends on:
 - Magnitudes of frictions.
 - Elasticities of default saving and non-saving.
- ▶ These objects are not identified from theory alone.
- ▶ **Goal:** use observed saving behavior to discipline magnitudes and elasticities.
- ▶ **For estimation,** I focus on individuals for whom non-saving is an **interior choice**, so that zero saving reflects **behavior** rather than binding constraints.

Quantitative Model of Default Effects

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- Agents choose:

$$(x_i, y_i) = \arg \max_{(x_i, y_i)} \left\{ \omega_i \ln(x_i + \alpha) + \ln(y_i) - \varphi_i^d \mathbf{1}\{x_i = d\} - \varphi_i^z \mathbf{1}\{x_i = z\} \right\}$$

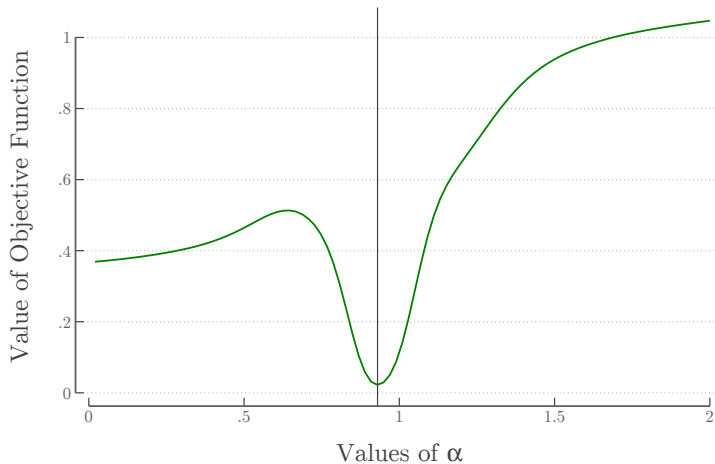
$$y_i = 1 - x_i, \quad \underline{x}_i \leq x_i \leq \bar{x}_i$$

- Frictions are distributed:

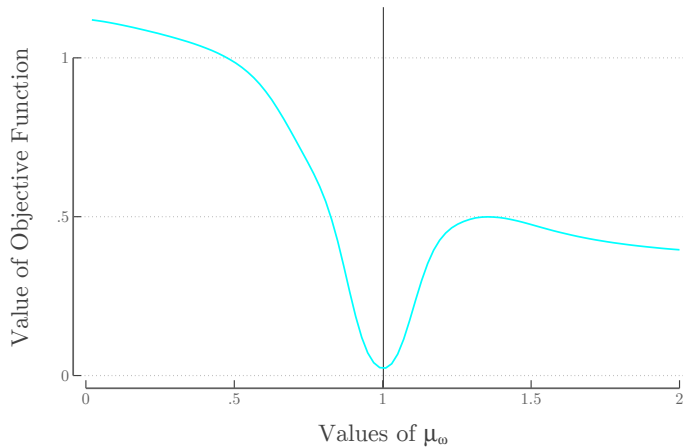
$$F(\varphi_i^j, j \in \{d, z\}) = \begin{cases} 0 & , \quad \varphi_i^j < 0 \\ \xi + \left[(1 - \xi) \left(1 - \exp\left(-\frac{\varphi_i^j}{\rho_2^j}\right) \right) \right] & , \quad \varphi_i^j \geq 0 \end{cases}$$

- Weighting parameter follows $\omega_i = \max\{0, \bar{\omega}\}$, $\bar{\omega} \sim N(\mu_\omega, \sigma_\omega^2)$
- Estimate $\zeta \equiv (\alpha, \mu_\omega, \sigma_\omega, \xi, \rho_d, \rho_z)$. Use parameter τ to adjust normativity of frictions.

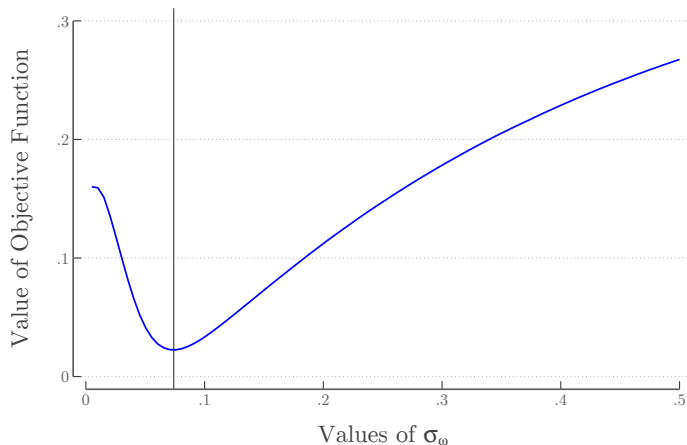
Identification of α

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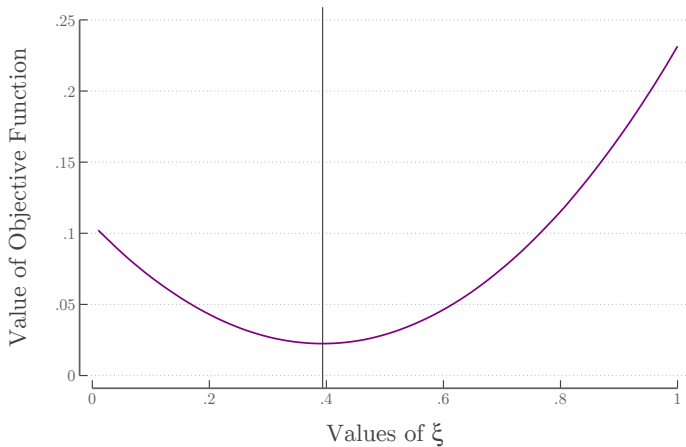
Identification of μ_ω

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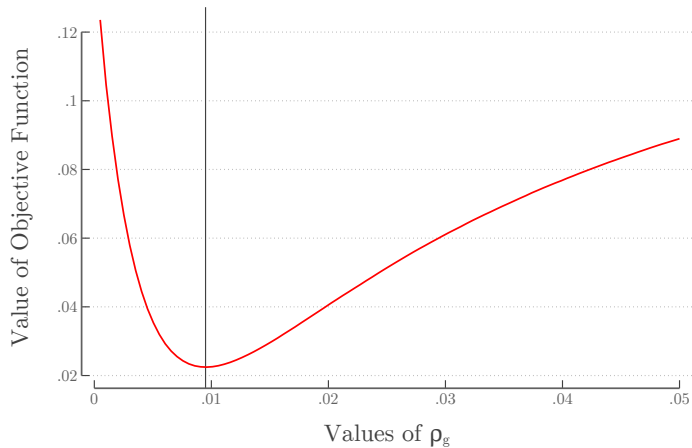
Identification of σ_ω

[Main Slides](#)

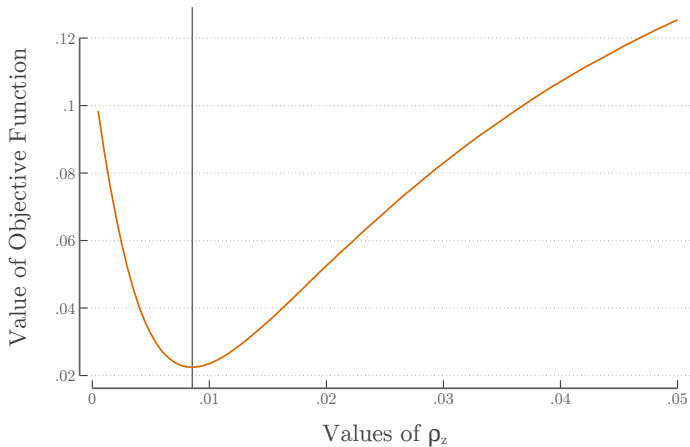
Identification of ξ

[Main Slides](#)

Identification of ρ_g

[Main Slides](#)

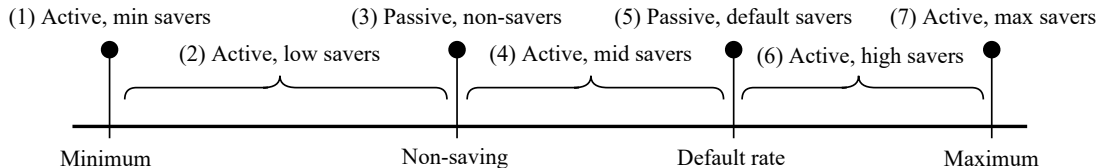
Identification of ρ_z

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Estimation Moments for Quantitative Model

[Main Slides](#)

- Simulate from distributions of frictions and weighting parameter and estimate $\zeta \equiv (\alpha, \mu_\omega, \sigma_\omega, \xi, \rho_d, \rho_z)$ via simulated method of moments (SMM).



SMM Results for Ages 20–34

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	Identity Weighting Matrix	Optimal Weighting Matrix
As Percent of Wages:		
Default Rate Friction	0.672% (0.021%)	0.986% (0.1000%)
IRA Inactivity Friction	0.498% (0.018%)	0.763% (0.068%)
In Dollars for Median Enrollee:		
Default Rate Friction	\$222.8 (\$7.0)	\$326.9 (\$33.3)
Inactivity Friction	\$165.1 (\$6.0)	\$252.9 (\$25.3)

SMM Results for Ages 35–49

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	Identity Weighting Matrix	Optimal Weighting Matrix
As Percent of Wages:		
Default Rate Friction	0.579% (0.028%)	0.840% (0.052%)
IRA Inactivity Friction	0.553% (0.024%)	0.825% (0.056%)
In Dollars for Median Enrollee:		
Default Rate Friction	\$226.3 (\$10.8)	\$284.8 (\$22.2)
Non-Saving Friction	\$216.8 (\$9.5)	\$356.2 (\$24.2)

SMM Results for Ages 50–59

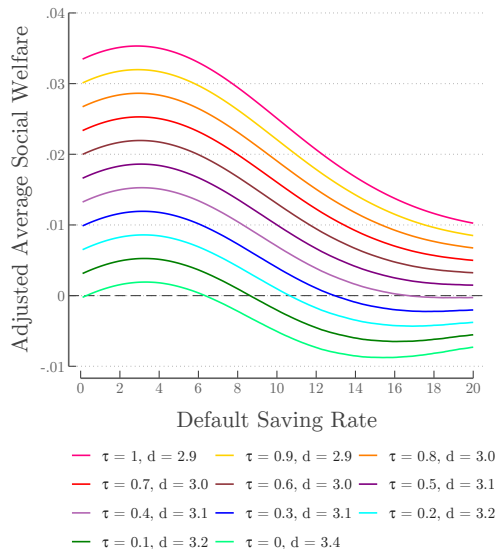
[Main Slides](#)

	Identity Weighting Matrix	Optimal Weighting Matrix
As Percent of Wages:		
Default Rate Friction	0.564% (0.038%)	0.930% (0.059%)
Non-Saving Friction	0.663% (0.040%)	0.1.130% (0.065%)
In Dollars for Median Enrollee:		
Default Rate Friction	\$220.0 (\$14.9)	\$363.0 (\$23.4)
Non-Saving Friction	\$139.9 (\$11.3)	\$441.0 (\$25.3)

Results from SMM Estimation

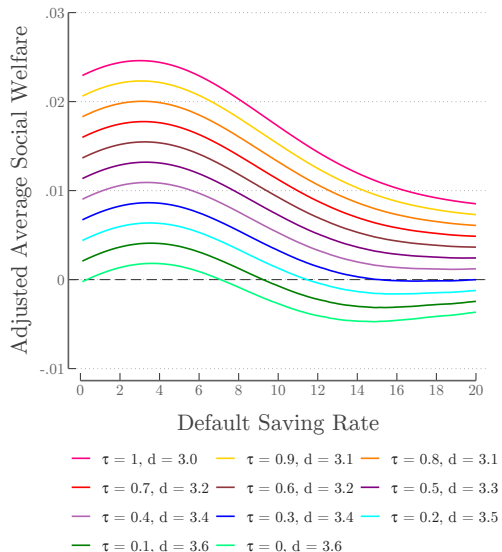
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	Parameters of ω_i			Parameters of φ_i^d and φ_i^z		
	α	μ_ω	σ_ω	ξ	ρ_d	ρ_z
Full Sample	0.930 (0.001)	1.002 (0.001)	0.074 (0.001)	0.394 (0.005)	0.010 (0.001)	0.009 (0.001)
Ages 20–34	0.932 (0.000)	1.001 (0.000)	0.070 (0.000)	0.409 (0.002)	0.013 (0.000)	0.009 (0.000)
Ages 35–49	0.930 (0.001)	1.002 (0.001)	0.074 (0.001)	0.418 (0.008)	0.011 (0.000)	0.009 (0.000)
Ages 50–59	0.929 (0.001)	1.005 (0.001)	0.083 (0.001)	0.376 (0.002)	0.010 (0.001)	0.011 (0.001)



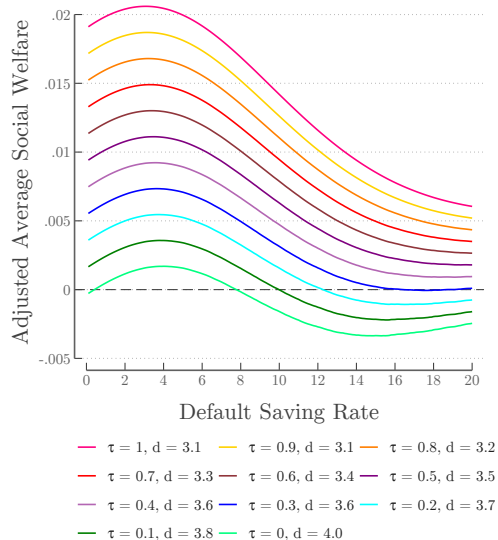
Optimal Defaults under Normative Ambiguity: Ages 20–34

- **Figure:** optimal default rate by normativity of frictions.
 - $\tau = 1 \Rightarrow$ frictions reflect real costs.
 - $\tau = 0 \Rightarrow$ frictions reflect biases.
- Zero corresponds to welfare under a **punishment default** (i.e., forced opt-out).
 - Positive values $\Rightarrow$ interior defaults increase welfare.
- Optimal default between **2.9% and 3.4%**.
- [Main Slides](#)



Optimal Defaults under Normative Ambiguity: Ages 35–49

- **Figure:** optimal default rate by normativity of frictions.
 - $\tau = 1 \Rightarrow$ frictions reflect real costs.
 - $\tau = 0 \Rightarrow$ frictions reflect biases.
- Zero corresponds to welfare under a **punishment default** (i.e., forced opt-out).
 - Positive values $\Rightarrow$ interior defaults increase welfare.
- Optimal default between **3.0% and 3.6%.**
- [Main Slides](#)



Optimal Defaults under Normative Ambiguity: Ages 50–59

- ▶ **Figure:** optimal default rate by normativity of frictions.
 - ▶ $\tau = 1 \Rightarrow$ frictions reflect real costs.
 - ▶ $\tau = 0 \Rightarrow$ frictions reflect biases.
- ▶ Zero corresponds to welfare under a **punishment default** (i.e., forced opt-out).
 - ▶ Positive values $\Rightarrow$ interior defaults increase welfare.
- ▶ Optimal default between **3.1% and 4.0%.**
- ▶ [Main Slides](#)

Social Welfare Function

$$\tilde{W}_\tau(d) = \int_i v_i^\tau(d) - \tilde{v}_i^\tau \, di$$

$$\begin{aligned} v_i^\tau(d) = & \left(u(x_i^*) - \tau_i^d \varphi_i^d - \tau_i^z \varphi_i^z \right) * 1\{\text{active saver}\} \\ & + \left(u(d) - \tau_i^z \varphi_i^z \right) * 1\{\text{default rate saver}\} \\ & + \left(u(z) - \tau_i^d \varphi_i^d \right) * 1\{\text{non-saver}\} \end{aligned}$$

$$\begin{aligned} \tilde{v}_i^\tau = & \left(u(x_i^*) - \tau_i^d \varphi_i^d - \tau_i^z \varphi_i^z \right) * 1\{\text{non-saving} \succeq \text{active saving}\} \\ & + \left(u(z) - \tau_i^d \varphi_i^d \right) * 1\{\text{active saving} \succ \text{non-saving}\} \end{aligned}$$

Asymmetric Normativity ($\tau^d \neq \tau^z$)

Main Slides

- ▶ Allow the welfare relevance of frictions to differ:
 - ▶ τ^d : normativity of opting out of **default saving**.
 - ▶ τ^z : normativity of opting out of **non-saving**.
- ▶ This addresses whether policy conclusions depend on **which** friction is normative.

		τ^d (default)				
		0	0.2	0.5	0.8	1
τ^z (non-saving)	0	3.7%	3.5%	3.4%	3.4%	3.3%
	0.2	Active	3.4%	3.4%	3.3%	3.2%
	0.5	Active	3.4%	3.3%	3.2%	3.2%
	0.8	Active	Active	3.1%	3.1%	3.0%
	1	Active	Active	3.0%	3.0%	3.0%

- ▶ **How to read:** each cell reports the welfare-maximizing default $d^*(\tau^d, \tau^z)$.
- ▶ **Main pattern:** interior defaults persist across a broad range of (τ^d, τ^z) .
- ▶ “Active choice” is optimal only when $\tau^z \gg \tau^d$ (empirically unlikely).

Bonus: Additional Work Examining Auto-IRAs

- ▶ **Retirement saving policies** are most often evaluated by the extent to which they **increase** resources for **retirement**.
 - ▶ This criterion overlooks the **working-life liquidity value** of retirement saving.
- ▶ **What we know:** automatic enrollment increases savings, but job separation, withdrawals, and other offsets erode this advantage.
 - (Hung et al., 2021); (Choi et al., 2024); (Choukhmane, 2025)
- ▶ **What remains unresolved:** what drives withdrawals from induced balances?
 1. Regret over prior saving, inattention, or premature consumption due to impatience, or;
 2. Rational consumption smoothing due to acute liquidity needs?
- ▶ If the latter, **pre-retirement dissaving** can benefit welfare.

Bonus: Additional Work Examining Auto-IRAs

- ▶ **This paper:** examine the state in which pre-retirement withdrawals occur following **automatic enrollment** using state auto-IRAs.
- ▶ Does **pre-retirement dissaving** yield welfare gains through **liquidity** in the working life?
 1. Does auto-IRA enrollment generate additional liquid or partially liquid wealth?
→ Answer: yes, IRA balances increase with no response in taxable balances.
 2. Do auto-IRA enrollees access this wealth during their working lives?
→ Answer: yes, withdrawals increase following auto-IRA enrollment.
 3. In which states does this dissaving occur?
→ Answer: auto-IRA enrollees dissave more than control individuals in low-income periods and not during normal income periods.
 4. Does this state-contingent dissaving yield welfare gains?
→ Answer: maybe. Simulations suggest yes if lower earnings imply high MU of consumption.

Bonus: Main Takeaway on Optimal Defaults

[Main Slides](#)

- ▶ In a setting with **two friction-preferred choices** (default saving and non-saving), the welfare effects of a higher default depend on **displacement across friction-preferred options**.
- ▶ **Result:** optimal defaults are **low and stable** under normative ambiguity, because high defaults induce more active choice only by increasing non-saving.
- ▶ **Policy implication:** maximizing default adherence (opt-out minimization) is generally not optimal; the relevant tradeoff is **default saving vs. non-saving**, not default saving vs. active choice alone.

Bonus: Allowing for Undersaving Internalities

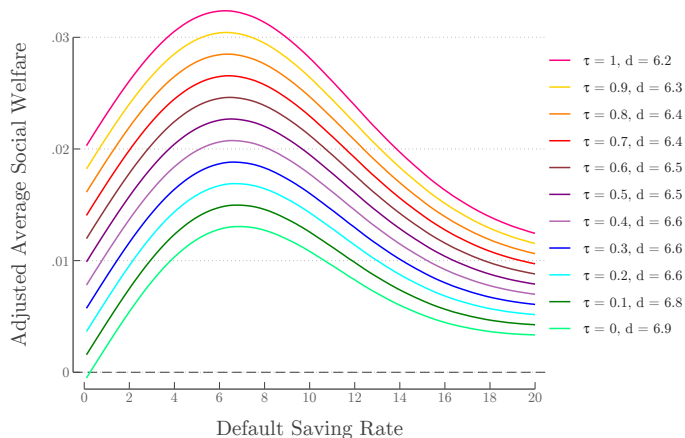
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- ▶ So far, welfare differences arise only from:
 - ▶ Normative ambiguity in frictions (τ^d, τ^z) .
 - ▶ Displacement across friction-preferred choices.
- ▶ Policymakers may also worry about **undersaving** even under active choice.
- ▶ I incorporate undersaving as an **internality** that affects welfare but *not* decisions.

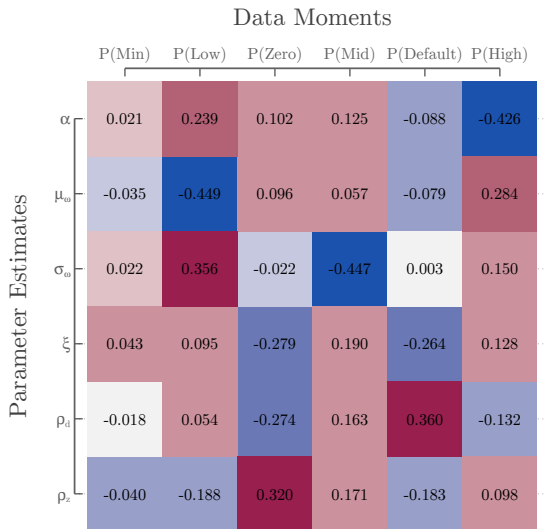
$$w_i(x, d, z) = u_i(x + c x) - \tau_i^d \varphi_i^d \mathbb{I}\{x \neq d\} - \tau_i^z \varphi_i^z \mathbb{I}\{x \neq z\}$$

- ▶ $c \geq 0$ captures the marginal welfare gain from saving:
 - ▶ $c = 0$: no internality (baseline model).
 - ▶ $c > 0$: agents undervalue saving relative to social welfare.
- ▶ Decisions are unchanged; only welfare comparisons shift.

Bonus: Optimal Defaults with an Undersaving Internality

[Main Slides](#)

- ▶ Assumes undersaving internality of **\$0.10**.
- ▶ **Result:**
 - ▶ Optimal default rises modestly to **6.2%–6.9%**.
- ▶ **Mechanism:**
 - ▶ increasing saving yields new welfare gains.
 - ▶ Easiest way to rationalize high defaults.



- **Sensitivity** analysis following AGS, (2017).
- Rows represent model **parameters**, cells **data moments**.
- Each cell is **first derivative** of the parameter estimates wrt underlying data moments.
 - Normalized relative to overall variation.
- Data moments that drive identification **align with theory**.
- Main Slides Conclusion

Bonus: How the Data Discipline the Model

[Main Slides](#)

- Each parameter is pinned down by a **distinct behavioral margin**.

Empirical pattern	Model object it identifies
Excess mass at the default rate	Default friction magnitude (ρ^d)
Excess mass at non-saving ($z = 0$)	Non-saving friction magnitude (ρ^z)
Default adherence falls as d rises	Elasticity of passivity to default cost
Shares of active saving (low/mid/high)	Distribution of preferred saving rates

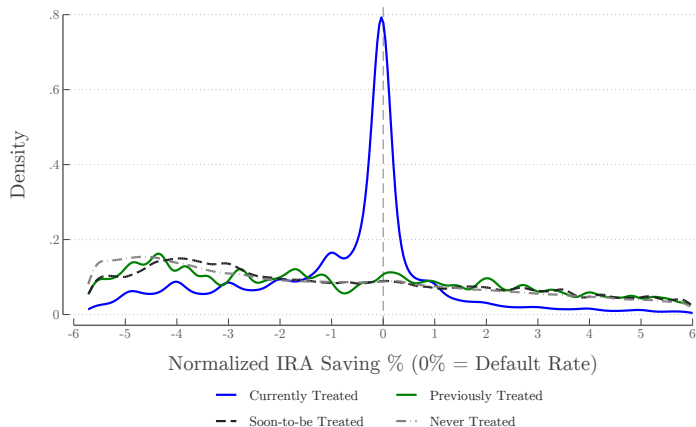
- **Takeaway:** the model is disciplined jointly by **levels** (bunching) and **slopes** (responses to d).

Bonus: Robustness and Identification Summary

[Main Slides](#)

- ▶ **Frictions are stable** across alternative estimation choices:
 - ▶ Identity vs. optimal weighting matrix.
 - ▶ Age-specific estimations.
 - ▶ Subsamples excluding high earnings volatility.
- ▶ **The optimal default is robust:**
 - ▶ Optimal default remains **interior** for empirically plausible normativity assumptions.
 - ▶ “Active choice” becomes optimal only under **extreme asymmetry** (non-saving friction highly normative relative to default friction).
- ▶ **Interpretation:**
 - ▶ Robust interior optima arise because the model’s key displacement margin (default saving ↔ non-saving) is disciplined directly by observed behavior.

Bonus: Density of Saving Rates for Interior Savers



Gaussian kernel --- Bandwidth = 0.15

- ▶ **Sample:** individuals with **nonzero** IRA saving or withdrawals.
- ▶ **Figure:** density of saving rates by treatment status.
- ▶ **Trough** on either side of the default suggests wedge between passivity and active choice.
- ▶ Little evidence of bunching away from the default.