Household Investment in 529 College Savings Plans and Information Processing Frictions

James J. Li, Olivia S. Mitchell, Christina Zhu

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Research Questions

1) **How are households' 529 college savings plan assets distributed?**

   - **Do households make suboptimal investment decisions?**

2) **How do information processing frictions affect these suboptimal decisions?**

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Background

- Households can help finance their children's education through loans; applying for work-study programs, scholarships, and grants; and **529 college savings accounts**

  - State-sponsored accounts designed to encourage household savings for their beneficiaries' future education costs.

  - Household assets: $22 billion (June 2002) → $480 billion (December 2021)

How 529 College Savings Plans Work

- <u>State-sponsored</u>

  - 49 states and the District of Columbia offer 529 plans

  - Plan administered internally by the state or contracted to a recordkeeper (e.g., Ascensus) or asset manager (e.g., Blackrock)

  - **Households can choose to invest in any states' plan** (that does not have a residency requirement)

- <u>Tax-advantaged</u>

  - **Contribution**: households invest with after-tax dollars; some states give tax deductions for contributing to 529 plans, matching grants

Variation in tax benefits

Legend:
- Tax-parity states
- Tax-neutral states
- In-state tax benefit
- Program home state/In-state tax benefit

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How 529 College Savings Plans Work

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- ## Tax-advantaged

  - **Contribution**: households invest with after-tax dollars; some states give tax deductions for contributing to 529 plans, matching grants

  - **Growth**: tax-free

  - **Distribution**: tax-free if used for qualified education expenses

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How 529 College Savings Plans Work

- **Prepaid vs. Investment Plans**

    - Prepaid plan: purchase units of future tuition at state-set prices

    - Investment (education savings) plan: purchase funds that appreciate over time

- **Direct-sold vs. Advisor-sold Plans**

    - Direct-sold: purchased online or through mail; self-managed allocation

    - Advisor-sold: purchased through financial advisor; advisor-managed allocation

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Advantages of setting

- Only households can open 529 accounts

- Many states offer more than one plan, which allows us to exploit within-state differences in plan characteristics

- Many states offer both direct-sold and advisor-sold plans

  - Information frictions and advice-seeking

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Suboptimal home-state investment

Do households make suboptimal investment decisions?

Defined as: opening of an in-state account when the household can earn a higher expected payoff by opening an out-of-state account

➢ <u>Household decision-making process</u>

    a)   Whether to open an account **(participation decision)**

    b)   Where to open the account **(***location decision***)**

    c)   How much to invest (quantity decision)

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Modeling the Location Decision

- **Our model for the payoff of a 529 investment**, defined recursively for each time $t \in \{0, \ldots, T\}$ is:

$$Payoff_0^{s,p} = Contribution^{s,p}$$

$$Payoff_t^{s,p} = \left(Payoff_{t-1}^{s,p}\right)\left(Return^{s,p}\right) - a^p$$

$$Terminal\ Payoff^{s,p} = \left(Payoff_T^{s,p} - Contribution^{s,p}\right)\left(Distribution^{s,p}\right) + Contribution^{s,p}$$

where s is the household's state of residence, p is the plan where the household can open an account, and a^p is the annual dollar-based account maintenance fee.

- **Dollar Welfare Loss:**

$$Dollar\ Welfare\ Loss^{s,p} = Terminal\ Payoff^{s,optimal} - Terminal\ Payoff^{s,p}$$

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Modeling the Location Decision

COST EXAMPLES

The following examples are intended to help you compare the cost of investing in Class A, Class C, Class I, and Class AR Units of the various Investment Portfolios with the costs of investing in other qualified tuition programs under Section 529.

The examples assume:

a. You invest $10,000 in the noted class of Units in the noted Investment Portfolio for the time periods indicated;

b. Your investment has a 5% return each year;

c. The Investment Portfolio's operating expenses remain the same (including the operating expenses of the Underlying Fund(s));

d. All Units redeemed, if any as noted, are used to pay Qualified Higher Education Expenses (the tables do not consider the impact of any potential state or federal taxes on the redemption);

e. You pay the applicable maximum Initial Sales Charge on Class A Units and any CDSC applicable to Units invested for the applicable periods in Class C Units or Class AR Units;

f. For the Class C Units Example, the Class C Units converted to Class A Units at the end of the sixth year and were thereafter subject to the costs associated with Class A Units; and

g. For the Class AR Units Example, the Class AR Units converted to Class A Units at the end of the first year and were thereafter subject to the costs associated with Class A Units.

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Implementing the model

- Data on 529 plan characteristics, AUM, open accounts, and state-level data

<u>Datasets</u>

- **Municipal Securities Rulemaking Board (MSRB)**: plan disclosures

- **College Savings Plan Network (CSPN)**: open accounts and assets

- **Morningstar**: returns of investment options

- **Financial Industry Regulatory Authority (FINRA)'s National Financial Capability Survey (NFCS)**: household financial literacy

- **Census Bureau's American Community Survey (ACS)**: household demographics

- **Census Bureau's Annual Survey of State & Local Government Finances (ASSLGF)**: state education revenues and expenditures
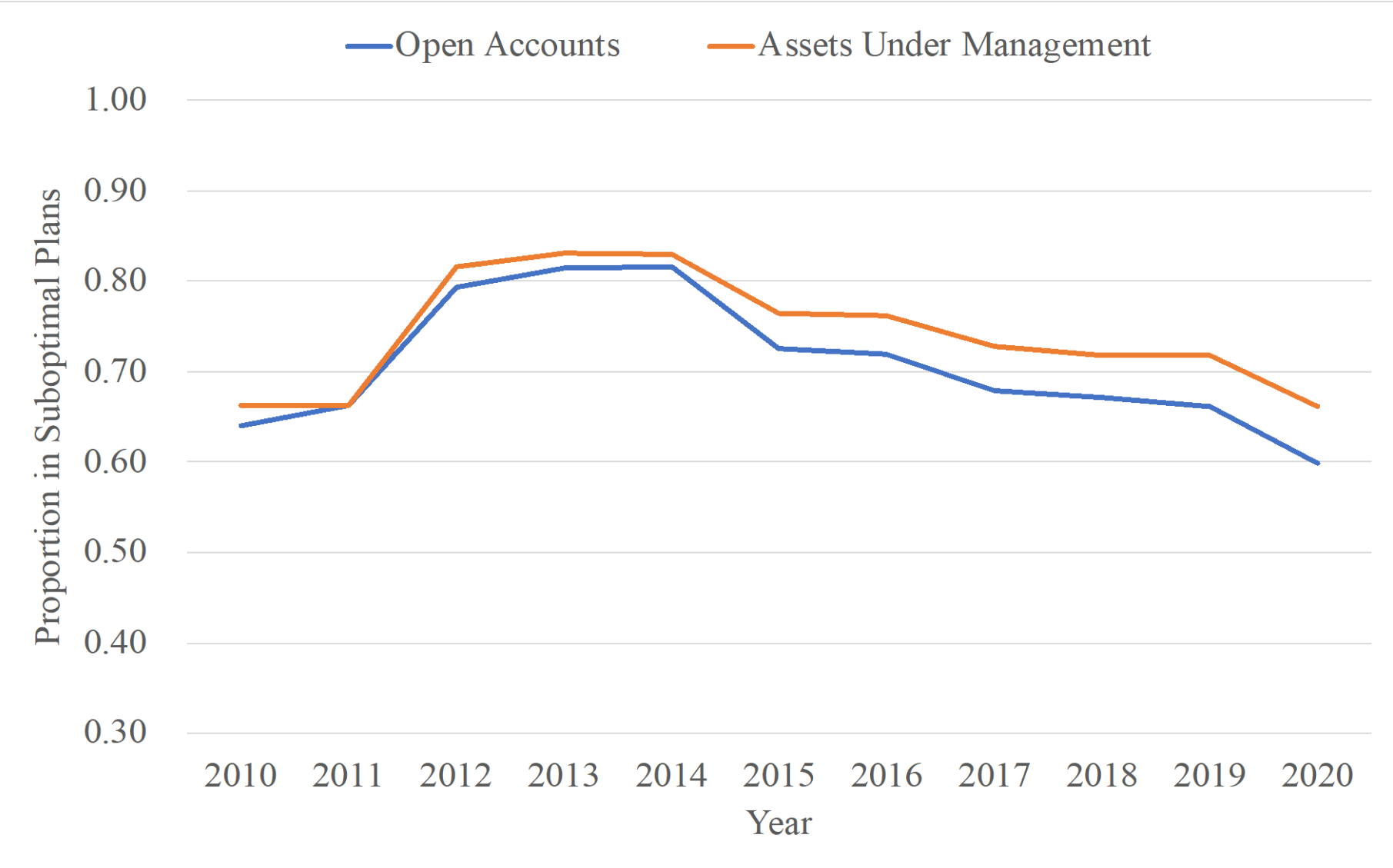
Sample

- 2010 to 2020

- 803 plan-years

- 117 unique plans

- 49 U.S. states + D.C.

- In 2020, households held 14.9 million open accounts with a total of $425.2 billion in assets

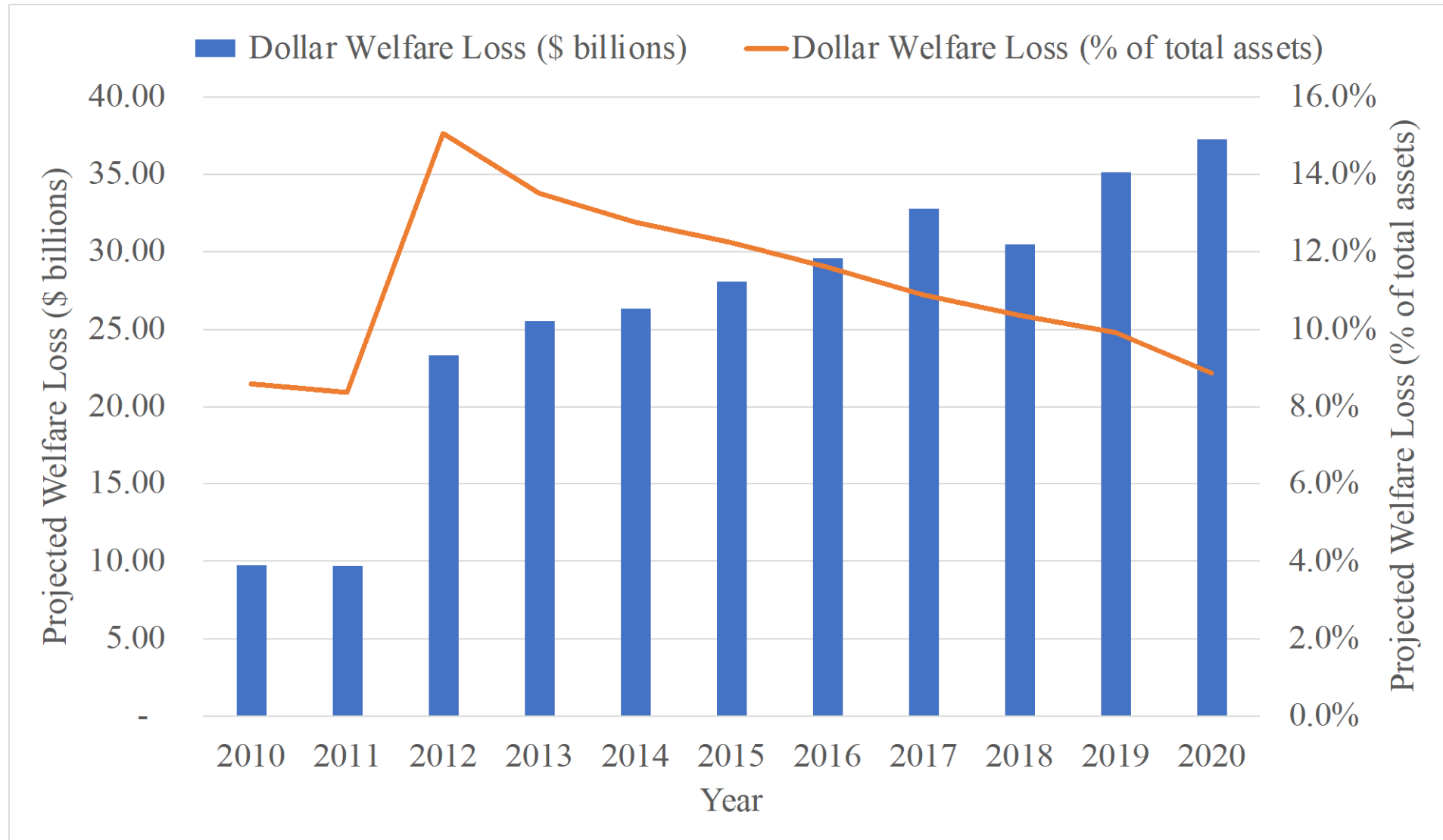Wharton

Examples of optimal classifications

- Alabama: Alabama's Collegecounts 529 Fund Direct-Sold Plan

  - AL has a tax deduction

- Maine: Maine's Nextgen College Investing Plan Direct

  - ME offers multiple matching grants for in-state residents

- California: California's Scholarshare College Savings Plan

  - CA offered the best plan nationwide without residency restrictions (lowest asset-based fees, no additional fees)

- Pennsylvania: California's Scholarshare College Savings Plan

  - PA offers tax parity, so the household could earn a tax deduction for contributing to any plan nationwide

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Suboptimal investment is widespread

Chart: Line graph titled with axes "Proportion in Suboptimal Plans" (y-axis, 0.30 to 1.00) and "Year" (x-axis, 2010 to 2020). Two lines: Open Accounts (blue) and Assets Under Management (orange). Annotations: 8.9 million accounts (orange), $281 billion (blue).

Dollar Welfare Loss

Ex-post Performance

Table 3A: Sharpe Ratios of Optimal Plans vs. Suboptimal Plans

t-test	Sharpe Ratio (3-Year)	Sharpe Ratio (5-Year)	Sharpe Ratio (10-Year)
Difference (Optimal – Suboptimal)	0.052***	0.052***	0.051***
	(21.801)	(21.300)	(14.587)
Observations	484	357	74

Table 3B: Sharpe Ratios of Optimal Plans with Out-of-State Program Managers vs. Suboptimal Plans with In-State Program Managers

t-test	Sharpe Ratio (3-Year)	Sharpe Ratio (5-Year)	Sharpe Ratio (10-Year)
Difference (Optimal – Suboptimal)	0.053***	0.050***	0.052***
	(10.025)	(9.181)	(8.693)
Observations	81	61	11

The Role of Information Processing Frictions

1) Proxy for Information Processing Frictions: Financial Literacy

- Savvier households may better understand how plan components affect terminal payoffs.

- The financial literacy literature generally shows that less savvy individuals make suboptimal decisions regarding contributing to savings and retirement plans (e.g., Hastings et al. 2013; Lusardi and Mitchell 2014).

- **Hypothesis:** We expect a positive relationship between state-level household financial literacy and the relative proportion of open accounts invested in the optimal home plans.

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Explaining the Proportion of Optimal Accounts

Variable	(a)	(b)	(c)	(d)
Literacy: Test Questions Correct	2.014***		2.370***	
	(3.185)		(5.569)	
Literacy: Self-Assessed High		-0.991		-1.980***
		(-1.703)		(-4.213)
Disclosure Complexity 1 (ratio)	-1.105***	-0.990***		
	(-4.502)	(-5.047)		
Disclosure Complexity 2 (ratio)			-1.794***	-1.783***
			(-5.767)	(-5.415)
Total Asset-Based Fee	-0.751***	-0.736***	-0.510**	-0.471**
	(-5.387)	(-5.610)	(-2.933)	(-2.547)
Married Household Income	0.003**	0.001	0.004***	0.002
	(2.621)	(1.478)	(3.635)	(1.711)
Expected 529 Partipication	1.402***	2.432***	1.155***	2.537***
	(4.694)	(15.968)	(3.738)	(9.542)
Observations	109	109	109	109
Year Fixed Effects	Y	Y	Y	Y
Adjusted R^2	0.341	0.321	0.498	0.486

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Explaining the Proportion of Optimal Accounts

2) Information Processing Friction: Disclosure Complexity

- Plans have been criticized as complicated, with some having faced lawsuits for potentially misleading advertising (Baldwin vs. Merrill Lynch 2019, Sommer 2022).

  - Average plan disclosure statement and participation agreement includes >60 pages of financial and accounting information.

- **Hypothesis:** We expect that increased complexity of the optimal home plan's disclosure document relative to the suboptimal home plan's disclosure document is associated with lower investment in the optimal home plan compared to the suboptimal home plan.

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Explaining the Proportion of Optimal Accounts

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Additional Analysis

- **Robustness Analysis**

  - Robust to variations in the time horizon

  - Robust to variations in the contribution amount and frequency

  - Robust to alternative assumption about extrapolating past performance

- **Participation Decision**

  - Participation puzzle: households' non-participation in risky asset markets despite a positive risk premium (e.g., Campbell 2006)

  - We find that individuals in states with lower financial literacy and higher disclosure complexity to have lower rates of 529 plan participation.

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Conclusions

- A meaningful proportion of 529 plan assets (66% of AUM and 60% of accounts) is suboptimally located in expensive home-state plans without offsetting tax benefits.

- Projected dollar losses amount to $38 billion, or 9% lower ROI, over 18 year holding period.

- **Losses greater among the less financially literate and for states with more complex plan disclosure.**

- No federal agency is currently charged with ensuring the safety, quality, and cost-effectiveness of college savings plans

Modeling the Location Decision

- Assuming a one-time $10,000 investment:

$$Contribution^{s,p} = 10{,}000(1-\tau^s) + \begin{cases} \pi^s \tau^s & if & \pi^s \leq 10{,}000 \\ 10{,}000\tau^s & if & \pi^s > 10{,}000 \end{cases} + Matching\ Grant^{s,p}$$

where τ^s represents the effective tax rate for a household in state s, and π^s represents the state limit on the amount of contributions available to be used for tax deductions.

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Modeling the Location Decision

- Return:

$$Return^{s,p} = \begin{cases} (1 + 0.05)(1 - f^p) & \text{if } p \text{ is } education\ savings \\ 1 + u^{s\prime} & \text{if } p \text{ is } prepaid \end{cases}$$

where f^p represents the annual asset-based percentage fee for plan p, while $u^{s\prime}$ represents the annualized tuition increase of the flagship university of the state $s\prime$ that sponsors plan p.

Modeling the Location Decision

- Distribution:

$$Distribution^{s,p} = \begin{cases} 1 - \tau^s & \text{if } s \text{ is } Alabama \text{ and } p \text{ not in } Alabama \\ 1 & \text{otherwise} \end{cases}$$

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Explaining the Participation Rate

1) **Participation Puzzle**

- Participation puzzle: households' non-participation in risky asset markets despite a positive risk premium

- Households prefer holding riskless assets but not stocks due to actual or perceived costly information about the stock market (e.g., Haliassos and Bertaut 1995, Bertaut 1998).

- **Hypothesis:** We expect that information processing costs affect the decision to open a 529 account in ways similar to how they affect where to locate the 529 account. Specifically, we expect individuals in states with lower financial literacy and higher disclosure complexity to have lower rates of 529 plan participation.

Explaining the Participation Rate

Variable	(a)	(b)	(c)	(d)
Literacy: Test Questions Correct	5.283***		5.532***	
	(9.780)		(11.009)	
Literacy: Self-Assessed High		-0.089		0.433
		(-0.247)		(0.914)
Disclosure Complexity 1	-0.114***	-0.123***		
	(-8.200)	(-9.959)		
Disclosure Complexity 2			-0.014***	-0.015***
			(-7.325)	(-9.790)
Education Shortfall Per Capita	-0.001	0.005**	0.001	0.007***
	(-0.609)	(2.696)	(0.804)	(7.119)
Married Household Income	0.040***	0.006	0.046***	0.011**
	(10.645)	(1.173)	(12.543)	(2.378)
Expected 529 Participation	0.040***	0.006	0.046***	0.011**
	(10.645)	(1.173)	(12.543)	(2.378)
Observations	469	469	469	469
Year Fixed Effects	Y	Y	Y	Y
Adjusted R^2	0.151	0.082	0.118	0.043

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