

# Economic Effects of Financial Education on Saving and Borrowing

---

Tim Kaiser <sup>1</sup>   Annamaria Lusardi <sup>2</sup>   Lukas Menkhoff <sup>3</sup>   Maximilian Michael <sup>4</sup>

2025 EEA Congress

<sup>1</sup>RPTU Kaiserslautern-Landau and IfW Kiel, Germany

<sup>2</sup>Stanford University, USA

<sup>3</sup>DIW Berlin and IfW Kiel, Germany

<sup>4</sup>Kiel University and IfW Kiel, Germany

# Motivation & Background

---

## Motivation & Background

- Many households make suboptimal saving and borrowing decisions, undermining long-term financial well-being (Lusardi and Mitchell, 2014)
- Financial education is widely promoted to improve financial decision-making
- Prior studies show financial education can improve financial behaviors, but mainly report effects in standard-deviation terms. The real economic magnitude of these effects (e.g. dollars saved) remained unclear
- **Our contribution:** Translate the impact of financial education into tangible economic outcomes (percent changes, dollar amounts), focusing on both saving *and* borrowing behaviors

# Research Question

---

## Research Question

- **Key question:** What are the economic effects of financial education on household saving and borrowing outcomes?
- How large are the changes in saving behavior (e.g., likelihood to save, amount saved) and in borrowing behavior (e.g., loan take-up, debt amount) due to financial education?
- Do improved savings translate into reduced borrowing, or do both improve together? (Insights into the “co-holding puzzle” of simultaneously holding savings and debt).

# Literature Overview

---

# The Evolution of Financial Education Interventions

- **Early Studies (Pre-2014):**

- Primarily classroom-based programs with limited scope.
- Found minimal average effects, often significant only for low-literacy subgroups.

- **Recent Developments:**

- Interventions became more sophisticated, integrating techniques like: Text message reminders, Goal-setting approaches, Individual counseling
- Led to findings of significant, positive effects.

- **Key Insights from Modern Studies:**

- Young individuals are identified as a high-potential target group.
- Gender-specific analyses show positive and distinct effects.
- A better understanding of which channels are most effective.

# Placing Our Work in the Context of Prior Meta-Analyses

## A Timeline of Evolving Consensus

- **Fernandes et al. (2014):** The first major meta-analysis. Found minimal effects, but relied heavily on quasi-experimental designs (only 15 RCTs).
- **Miller et al. (2015):** Used more restrictive criteria. Found positive effects on retirement savings but negligible effects on credit outcomes.
- **Kaiser et al. (2022):** The most recent and comprehensive analysis (76 RCTs). Confirmed significant but smaller positive effects on debt management.

We construct a new, specialized sample of 35 RCTs that **jointly** measure saving and borrowing outcomes.

# The Co-Holding Puzzle

- **The Puzzle:** Why do households simultaneously hold high-interest debt and low-return liquid savings?
- A widely documented, seemingly suboptimal behavior in household finance (Gross and Souleles, 2002; Bertaut et al., 2009)

## Market Frictions

Co-holding is an optimal response to imperfect credit markets.

- Need for liquid savings for emergencies or transactions when credit is unavailable.

## Mental Accounting

Decisions are driven by cognitive biases.

- People treat saving and borrowing in separate "mental buckets" and fail to optimize.

## **Data & Methods**

---

# Database Construction and Inclusion Criteria

- **Systematic Search Strategy:**
  - **Keywords:** Combinations of "financial literacy," "financial capability" with "RCT," "experiment," "intervention," etc.
  - **Databases:** JStor, RCT-registry, RePEc, NBER
- **Inclusion Criteria:**
  1. Study reports outcomes on both saving and borrowing with a calculable effect size.
  2. Randomized Controlled Trial (RCT) design.
  3. Financial education as the primary intervention (no confounding treatments)
- **Final Sample:** 35 RCTs published through June 2024.
- **Data Coding:** We extracted 459 effect size observations from these studies, covering all relevant saving and debt outcomes (excluding purely robustness or secondary results). Outcomes are categorized as either savings-related or borrowing-related behaviors.

# Descriptive Statistics

Table 1: Descriptive Statistics

	N	Mean	Median	SD	Min/Max
<i>Panel A: Study-Level Characteristics</i>					
Study Composition					
Sample size	35	6,050	1,291	19,507	144/114,226
Published in top journals (%)	–	–	–	–	–
Income Distribution (%)					
Low income economies	35	31.4	–	–	0/100
Lower-middle income economies	35	25.7	–	–	0/100
Upper-middle income economies	35	25.7	–	–	0/100
High income economies	35	17.1	–	–	0/100
<i>Panel B: Effect-Level Characteristics</i>					
Effect Sizes					
Hedges' <i>g</i>	459	0.065	0.038	0.114	-0.227/0.550
Standard error	459	0.072	0.058	0.041	0.002/0.198
Sample Characteristics					
Mean age	417	36.8	38.6	8.30	15.7/49.4
Share male (%)	433	33.2	–	–	0/100
Share high education (%)	375	76.0	–	–	0/100
Treatment Characteristics					
Total duration (days)	394	92.2	65.0	133.0	1/990
Total intensity (hours)	344	15.6	8.0	24.0	0.5/108
Delivery Format (%)					
In-person classroom	459	71.5	–	–	0/100
Digital tool	459	15.9	–	–	0/100
Counseling	459	8.7	–	–	0/100
Information boost	459	0.4	–	–	0/100
Remote workshop	459	3.5	–	–	0/100
Share of Effects by Outcome Type (%)					
Debt management outcomes	459	47.9	–	–	0/100
Savings outcomes	459	52.1	–	–	0/100

# Methodology: Synthesizing Evidence with the Right Model

## 1. A Simple Approach (Not Used): Fixed-Effect Model

- Assumes one true common effect ( $\beta_0$ ) across all studies.
- Model:  $y_j = \beta_0 + \epsilon_j$  with  $\epsilon_j \sim N(0, \sigma_j^2)$
- Uses simple inverse variance weights:  $w_j = \frac{1}{\sigma_j^2}$
- **Too restrictive for our context**, as the impact of educational programs likely varies.

## 2. A Better Approach: Random-Effects Model

- Allows true effects to vary across studies via a random effect  $v_j$ .
- Model:  $y_j = \beta_0 + v_j + \epsilon_j$  where  $v_j \sim N(0, \tau^2)$
- Weights account for between-study variance ( $\tau^2$ ):  
 $w_j = (\tau^2 + \sigma_j^2)^{-1}$

## 3. Our Model: Robust Variance Estimation (RVE)

- An advanced random-effects model needed because studies often report **multiple, dependent outcomes**.
- The RVE weights explicitly account for this within-study correlation ( $\rho$ ):

$$w_{ij} = \left\{ \left( \tau^2 + \frac{1}{k_j} \sum_{i=1}^{k_j} \sigma_{ij}^2 \right) [1 + (k_j - 1)\rho] \right\}^{-1}$$

- $k_j$ : number of estimates within study  $j$ .
- $\rho = 0.8$ : assumed within-study correlation.

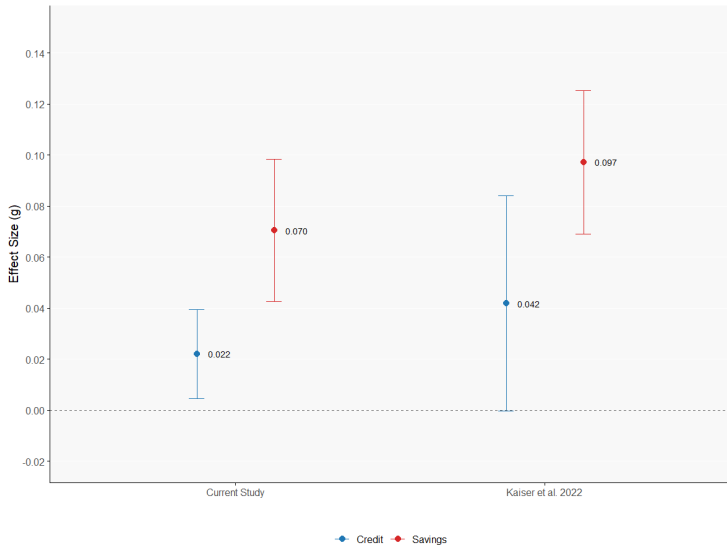
# Results

---

## Results – General Effect Sizes

- Financial education has a positive but modest average impact in standardized terms. Pooled effect size  $\approx 0.07$  SD for savings outcomes and 0.022 SD for borrowing outcomes.
- Saving behaviors respond strongly (highly significant), while borrowing behavior changes are smaller. Notably, we do observe non-negligible improvements in borrowing, contrary to earlier findings of “zero-effect” in that domain.
- Considerable heterogeneity: effect sizes range from -0.23 to +0.55 SD across studies. Some interventions show large gains, others nil or even slight negatives, suggesting context and program design matter.

# Results – General Effect Sizes



## Results – Economic Effects (Saving)

Table 3: Treatment Effects on Savings Outcomes

	Treatment Effect		SE	p-value	Studies	Obs.
	Effect	Control Mean				
<b>Actively saving</b>						
Relative change (%)	5.71**	–	1.96	0.015	17	56
Absolute change (pp)	3.35***	58.70	0.75	0.000	19	58
<b>Total savings balance</b>						
Relative change (%)	10.00	–	7.47	0.228	10	21
Absolute change (USD PPP)	70.20	702	50.40	0.215	11	25
<b>Has bank account</b>						
Relative change (%)	6.32	–	6.21	0.379	5	18
Absolute change (pp)	1.54	24.37	1.66	0.421	5	18
<b>Formal savings balance</b>						
Relative change (%)	31.6	–	17.00	0.161	5	17
Absolute change (USD PPP)	69.60	220.25	37.40	0.156	5	16
<b>Pooled Effects (Hedges' g):</b>						
Main outcomes	0.067****	–	0.016	0.000	28	118
Other Outcomes	0.068****	–	0.014	0.000	27	121

## Results – Economic Effects (Saving)

- **Saving incidence (extensive margin):** Financial education increases the probability of actively saving by about 5.7% relative to the control. In absolute terms, if 60% of the control group saves, the treatment raises this by 3.3 percentage points.
- **Amount saved (intensive margin):** Total savings accumulation grows by roughly 7% on average, corresponding to approximately \$70 (PPP) higher savings per person compared to the control group.
- **Formalization of saving:** More participants use formal savings channels after the intervention. Bank account ownership increases by 6.3% (1.5 pp increase, e.g. from 25% to 26.5% of individuals having an account). The average balance held in formal institutions rises by about 19% (from roughly \$350 to \$420).

# Results – Economic Effects (Borrowing)

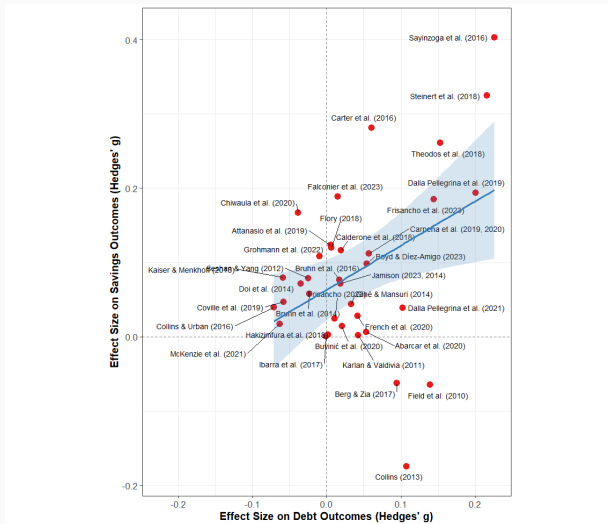
Table 4: Treatment Effects on Debt Outcomes

	Treatment Effect		SE	p-value	Studies	Obs.
	Effect	Control Mean				
<b>Currently has loan</b>						
Relative change (%)	5.84	–	3.46	0.144	9	17
Absolute change (pp)	0.82	14.04	0.56	0.201	9	17
<b>Outstanding debt</b>						
Relative change (%)	6.57	–	9.00	0.514	5	14
Absolute change (USD PPP)	33.60	511.53	88.50	0.766	5	14
<b>Has formal loan source</b>						
Relative change (%)	15.90	–	8.39	0.185	4	8
Absolute change (pp)	2.90	18.24	1.88	0.246	4	8
<b>Has informal loan source</b>						
Relative change (%)	8.80	–	6.59	0.261	6	9
Absolute change (pp)	1.78	20.23	1.43	0.296	6	9
<b>Timely loan repayment</b>						
Relative change (%)	-2.53	–	2.84	0.421	9	18
Absolute change (pp)	-0.24	9.49	0.19	0.272	12	22
<b>Pooled Effects (Hedges' g):</b>						
Main outcomes	0.018*	–	0.01	0.095	25	70
Other Outcomes	0.013	–	0.01	0.119	30	150

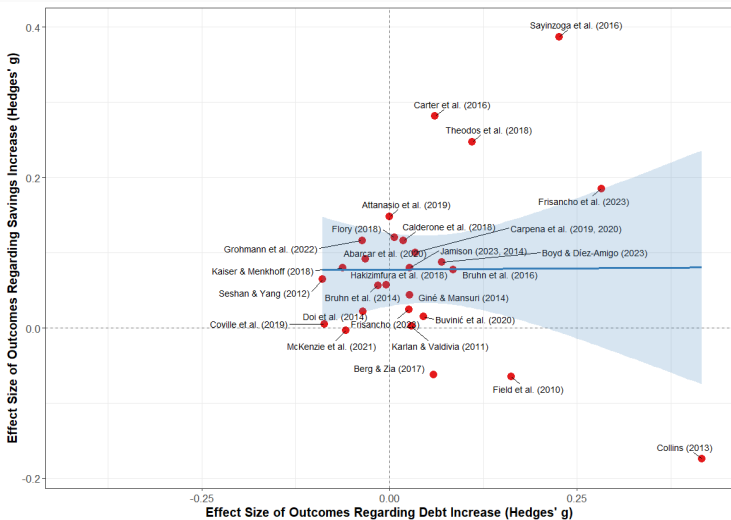
## Results – Economic Effects (Borrowing)

- **Loan uptake (extensive margin):** Probability of having a loan increases by roughly 6% relative to control (approximately +0.8 percentage points on a base of 15%; this effect is positive but modest).
- **Debt amount:** Average outstanding loan balance tends to be about 6–7% higher in the treatment group (an increase of roughly \$33 (PPP) per person on average).
- **Formalization of credit:** Participants are more likely to use formal loans (e.g., bank loans instead of informal borrowing). The share using formal loan sources rises by 16% (+2.9 pp, from about 18% to 21%).
- **Repayment behavior:** No significant improvement in loan repayment/delinquency outcomes; if anything, timely repayment rates change by about -2.5% (a slight decline, not statistically significant). In other words, financial education

# Joint Effects on Saving and Borrowing



# Joint Effects on Saving and Borrowing



# Joint Effects: Evidence for Mental Accounting

## Key Finding: A Positive Correlation

- Interventions that boost saving gains also tend to boost borrowing gains.
- This pattern holds at both the overall **study level** and the specific **outcome level**.

## Main Implication: Support for the Mental Accounting Hypothesis

- We find **no evidence of a trade-off**; participants do not use new savings to pay down debt.
- This suggests saving and borrowing are managed in separate "mental buckets."

# Robustness Checks

---

## Robustness Checks

- **Publication Bias:** Our main findings are robust to publication bias corrections (PET-PEESE). The core effect on *actively saving* remains positive and highly significant.
- **Joint Estimation:** The positive saving-borrowing correlation holds when estimated jointly in a multilevel model, strengthening confidence in our "mental accounting" result.
- **Additional Outcomes:** Including a wider range of secondary financial outcomes yields qualitatively consistent results, with no contradictory evidence found.

## **Conclusion & Future Research**

---

## Conclusion & Future Directions

- First systematic evidence of the **economic magnitude** of financial education's impact.
- Meaningful **+6% increase in saving incidence**.
- Provides strong support for the **Mental Accounting Hypothesis** in explaining the co-holding puzzle.
- Shows that financial education can be a highly **cost-effective** policy tool.

## What's next?

- **A Necessary Trade-Off:** Our focus on studies covering *both* saving and borrowing was crucial for the co-holding analysis, but reduced sample sizes for some economic effects, limiting statistical power.
- **The Next Step: Expanding the Scope:** We will now move beyond this constraint and construct a comprehensive meta-dataset.
  - This will integrate the RCTs from Kaiser et al. (2022) with all remaining relevant RCTs published since.
- **Future Research Goals:** This much larger sample will allow us to:
  - More powerfully estimate economic effects across a wider variety of outcomes.
  - Conduct a deeper analysis of the **determinants** of successful interventions to better understand "what works" and for whom.

# Conclusion & Future Research

Table 2: Determinants of Financial Education Effects

	Coefficient	SE	t-value	p-value
<i>Country Income Level</i>				
Country Income (ref: high income)				
Low income	-0.0244	0.1392	-0.1753	0.8611
Lower-middle income	0.0777	0.1457	0.5335	0.5943
Upper-middle income	-0.1710	0.1481	-1.1552	0.2494
<i>Socio-demographic Sample Characteristics</i>				
Above primary education	0.0847	0.1191	0.7113	0.4777
Mean age	-0.0076	0.0059	-1.3007	0.1949
Share male	0.0501	0.1207	0.4152	0.6784
<i>Pedagogical Approaches</i>				
Teaching Methods				
Interactive elements	-0.0061	0.0392	-0.1555	0.8766
Role-playing	-0.1384	0.0916	-1.5103	0.1326
One-on-one counseling	0.1760*	0.0759	2.3196	0.0214
Additional Components				
Information nudges	0.1346	0.1778	0.7569	0.4500
Edutainment	0.0378	0.1245	0.3038	0.7616
Psychological elements	-0.0130	0.0193	-0.6745	0.5008
Emotional elements	-0.0226	0.0958	-0.2365	0.8133
<i>Intervention Time Structure</i>				
Number of sessions	-0.0005	0.0065	-0.0721	0.9426
Hours per session	-0.0483	0.0263	-1.8375	0.0676
Total teaching hours	0.0165*	0.0065	2.5272	0.0123
Program duration (days)	-0.0036*	0.0015	-2.4083	0.0170
Constant	0.3399	0.3179	1.0692	0.2863

## References

---

- Bertaut, C. C., Haliassos, M., and Reiter, M. (2009). Credit card debt puzzles and debt revolvers for self control. *Review of Finance*, 13(4):657–692.
- Fernandes, D., Lynch Jr, J. G., and Netemeyer, R. G. (2014). Financial literacy, financial education, and downstream financial behaviors. *Management science*, 60(8):1861–1883.
- Gross, D. B. and Souleles, N. S. (2002). Do liquidity constraints and interest rates matter for consumer behavior? evidence from credit card data. *The Quarterly journal of economics*, 117(1):149–185.
- Kaiser, T., Lusardi, A., Menkhoff, L., and Urban, C. (2022). Financial education affects financial knowledge and downstream behaviors. *Journal of Financial Economics*, 145(2):255–272.
- Lusardi, A. and Mitchell, O. S. (2014). The economic importance of financial literacy: Theory and evidence. *American Economic Journal: Journal of Economic Literature*, 52(1):5–44.
- Miller, M., Reichelstein, J., Salas, C., and Zia, B. (2015). Can you help someone become financially capable? a meta-analysis of the literature. *The World Bank Research Observer*, 30(2):220–246.