

# Financial Education Affects Financial Knowledge and Downstream Behaviors

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## Main question and relevance

- Does financial education work?
- Many countries (more than 70) have designed or are designing national strategies for financial literacy
- It is important to rely on data and evidence
- What does the evidence say?

## A new meta-analysis

- The research on financial literacy has exploded (thanks OECD-INFE)
- Financial literacy has its own code in the *Journal of Economic Literature* (JEL) classification: G53! It is officially a field
- Very hard to do a narrative review of so much work
- A meta-analysis is a systematic quantitative literature review aggregating evidence from multiple studies on the same research question

## Previous meta-analyses on financial education

- The first meta-analysis by D. Fernandes, J. Lynch, and R. Netemeyer was published in 2014 in *Management Science*
- Other meta-analyses with different emphasis (Miller et al. 2015, Kaiser and Menkhoff 2017, 2019) have been published since, but Fernandes et al. (2014) have been most cited, in particular their two main findings:
  - 1) “We find that interventions to improve financial literacy explain only 0.1% of the variance in financial behaviors studied” (page 1861)
  - 2) “Intervention effects may decay over time – the case for ‘just in time financial education’.”(page 1866)

## The influence of the first meta-analysis is reflected even in the media

### THE QUEST TO IMPROVE AMERICA'S FINANCIAL LITERACY IS BOTH A FAILURE AND A SHAM

Financial literacy promotion may sound perfectly sensible—who wouldn't want to teach children and adults the secrets of managing money?—but in the face of recent research it looks increasingly like a faith-based initiative.

HELAIINE OLEN · JAN 7, 2014

PostEverything · Perspective

### More states are forcing students to study personal finance. It's a waste of time.

Study after study shows that financial-literacy courses don't change behavior.

ECONOMIC VIEW

### *Financial Literacy, Beyond the Classroom*

By Richard H. Thaler

Oct. 5, 2013



BUSINESS // MICHAEL TAYLOR

### Taylor: Is financial literacy a bad thing?

Michael Taylor | Dec. 6, 2019 | Updated: Dec. 6, 2019 1:05 p.m.

TIME

FINANCIAL EDUCATION

### Financial Education Is All the Rage but Does it Work?

Reaching consumers with advice and information just before making a financial decision is the new target. But is that really more effective than teaching personal finance in K-12?

By Dan Kadlec @dankadlec | Oct. 25, 2013

HOME / MONEY / PERSONAL FINANCE / MY MONEY

### Why Investor Education Doesn't Work – And How to Change That

Employer-sponsored 401(k) meetings aren't always effective.

### Why financial literacy programs don't work

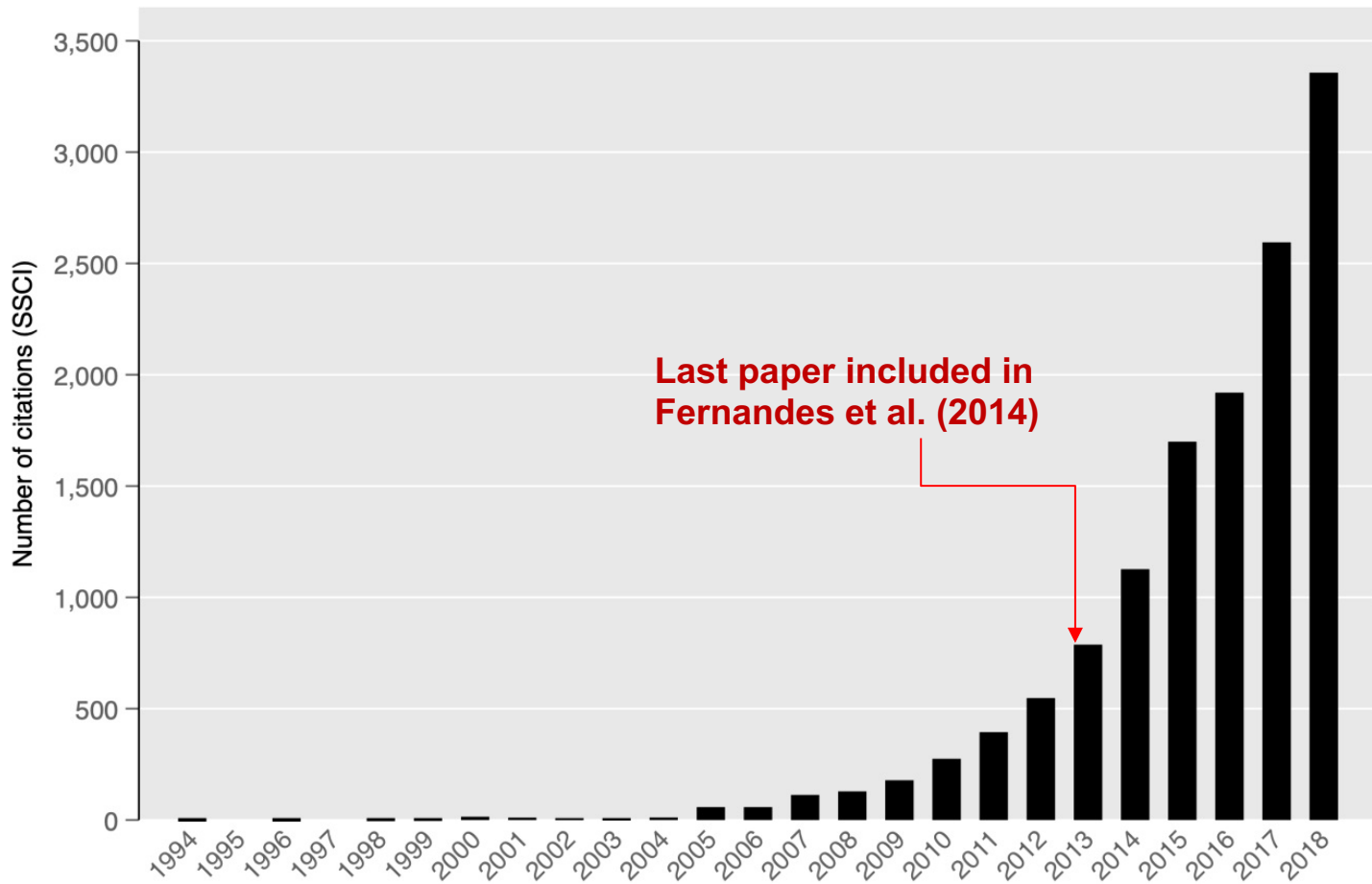
BY ATTY. DODO DULAY © JANUARY 01, 2019

HOME / OPINION / OP-ED COLUMNS / WHY FINANCIAL LITERACY PROGRAMS DON'T WORK

### CPFB head misguided in reliance on consumer education

BY LAUREN E. WILLIS, OPINION CONTRIBUTOR — 09/07/19 03:30 PM EDT  
THE VIEWS EXPRESSED BY CONTRIBUTORS ARE THEIR OWN AND NOT THE VIEW OF THE HILL

## Citations to the term “financial literacy” over time: Time for an update of the evidence



## New meta-analysis relative to Fernandes et al. (2014)

- Our study includes 76 RCTs (vs. 13) from 33 countries (vs. 8) with over 160,000 (vs. 23,000) individuals across the lifespan
- We focused on the most rigorous studies (RCTs) only, where effects are usually found to be smallest
- The sample include many low-income countries and experiments on low income individuals
- Effects are measured after 30 weeks, on average, and up to more than two years. If there is a decay, effects are likely to be small

## A preview of the findings

We found that:

- The estimated effect of financial education is ***at least three times as large*** as the effect documented in Fernandes et al. (2014)
- Accounting for differences in programs, effects are ***more than five times as large*** as the effects reported in Fernandes et al. (2014)
- We **do not find clear evidence** of a dramatic **decay** of the effects of financial education over time. Effects persist up to two years after intervention



## What we do in this paper

- (1) We take stock of the new evidence
  - Focus on RCTs, which are considered the gold standard of impact evaluation
  - Include all earlier studies and more than quintuple the number of RCTs (from 13 to 76)
    - Many more studies in top economics-journals
    - Can look at different types of behavior in addition to financial knowledge

## What we do (cont.)

- (2) Meticulous meta-analysis of these RCTs:
  - Account for heterogeneity in the effects of financial education
  - Probe sensitivity of results to the choice of model and interpretation of results
  - Consider the power of underlying studies
  - Considering potential publication bias
  - Analysis of intensity and decay of effects
  - Subgroup analyses

## What we do in this paper (cont.)

- (3) Calculations of the economic size of the effects and analysis of cost-effectiveness
  - What do the statistical effect sizes mean in economic terms?
  - What is the average cost of financial education and is it cost-effective?

## Toward a meta-analysis

### Main issues:

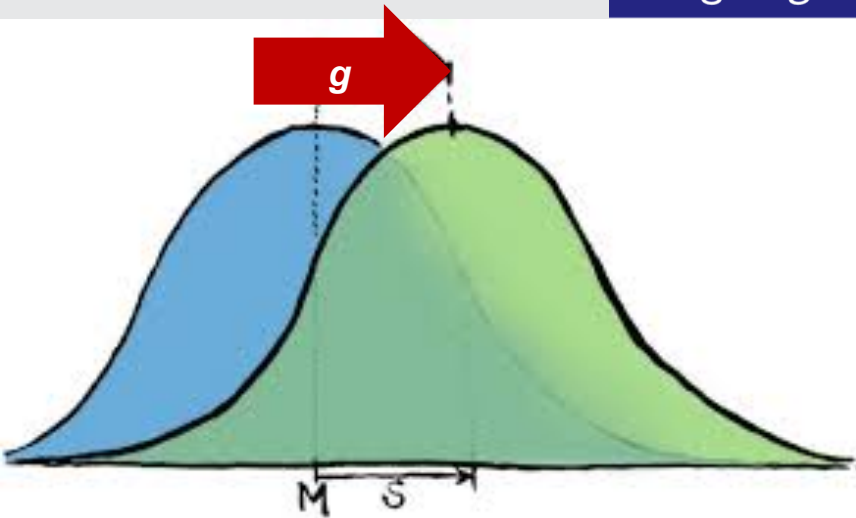
- We have a large number of studies and many estimates of the effects of financial education
- Papers may study multiple outcomes (e.g., different behaviors are studied)
- Outcomes may vary across studies (e.g., some studies look at saving rates and others at the savings amount)
- Interventions vary across studies; e.g., from giving an informational brochure to time-intensive education programs

## A primer on meta-analysis

A meta analysis requires to make effects comparable across studies: standardized mean differences (in scale-free standard deviation units).

Formally, we use Hedges'  $g$ .

Hedges'  $g$



$$g = \frac{M_T - M_C}{SD_p} \quad (1)$$

$$SD_p = \sqrt{\frac{(n_T - 1)SD_T^2 + (n_C - 1)SD_C^2}{n_T^2 + n_C^2 - 2}} \quad (2)$$

## Example

- Suppose we conduct an experiment on school-based financial education program using the PISA financial literacy assessment as an outcome
- Since the PISA financial literacy test is scaled to have a mean of 500 and a SD of 100, a standardized mean difference (g) of 0.2 SD units would mean an improvement of 20 points on the PISA scale relative to those students who were not assigned to the program.

## A primer on meta-analysis

### Meta-analysis model:

- Consider a set of randomized experiments, each of them reporting estimates of treatment effects relative to a control group
- Allow different experiments to result in different effects caused by the educational interventions (i.e., heterogeneity)
- Since the goal is to arrive at a “general effect” of financial education, one has to choose weights for each study that reflect the size of study (measurement error) and the actual differences in results (true heterogeneity)

## Formal model

$$y_{ij} = \beta_0 + v_j + \epsilon_{ij}$$

$y_{ij}$  is the  $i$ th treatment effect estimate within each study  $j$ .

$\beta_0$  is the mean of the distribution of true effects, i.e., the “general effect of financial education”

$v_j$  is a study-level random effect with  $v_j \sim N(0, \tau^2)$ , i.e., the true effects can vary between (but not within) studies.

$\epsilon_{ij} \sim N(0, \sigma_{ij}^2)$  is the residual of the  $i$ th treatment effect estimate within each study  $j$

- We observe both  $y_{ij}$  and  $\sigma_{ij}^2$  from the data
- $\tau^2$  needs to be estimated



## Formal model: Choosing the study weights

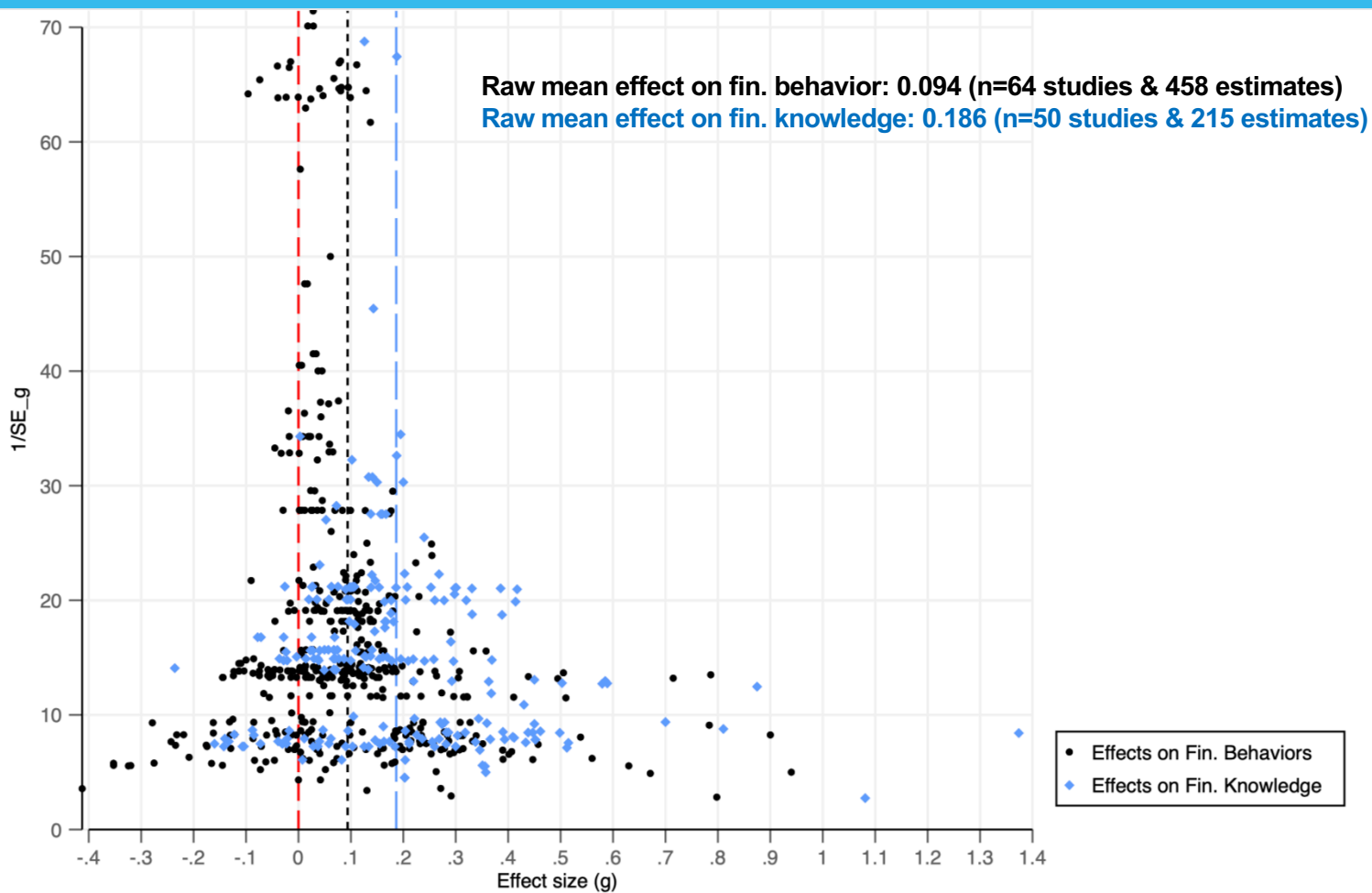
**Step 1:** Estimate  $\tau^2$  from the data

**Step 2:** Account for multiple correlated effects within studies

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

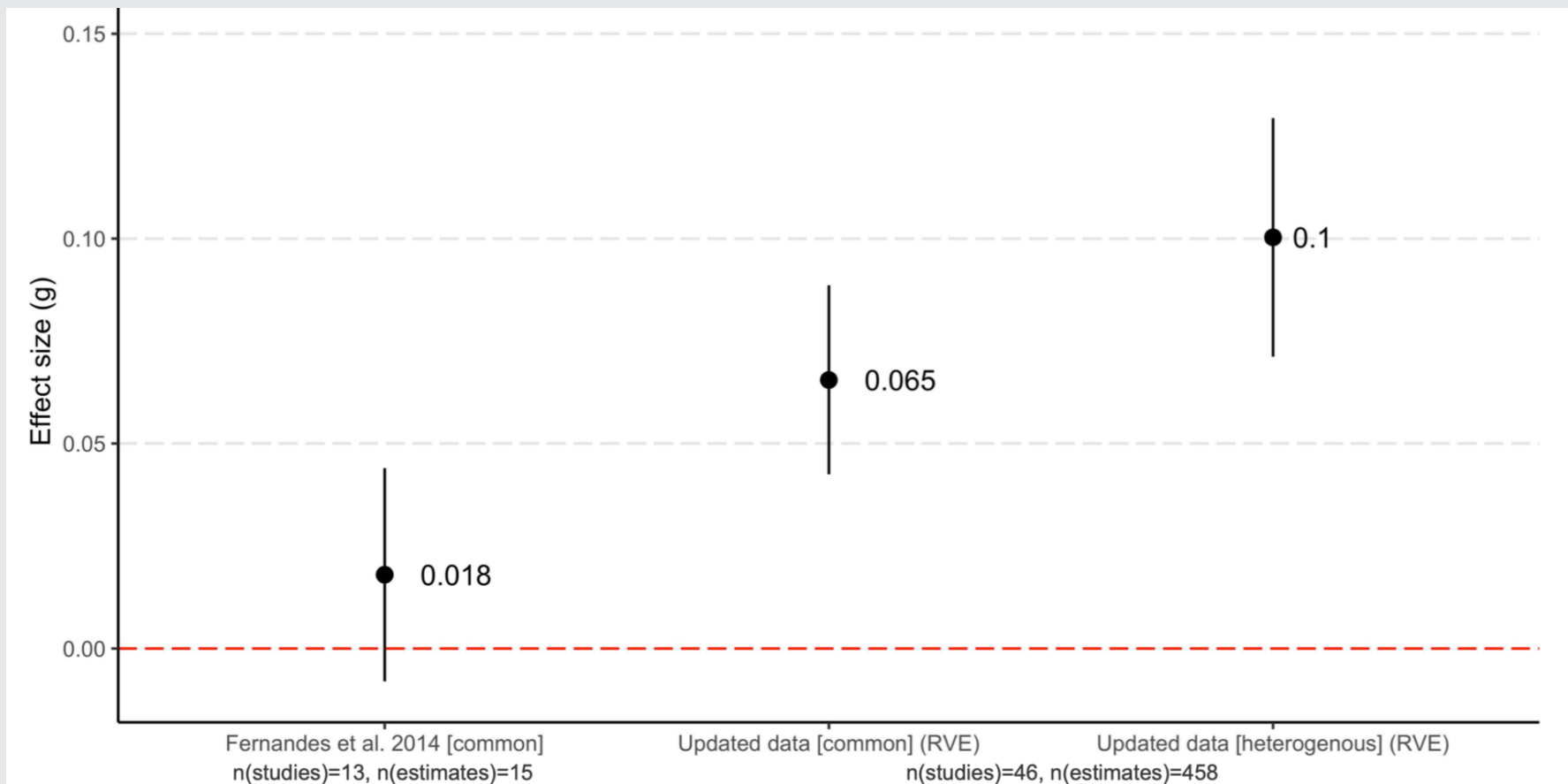
**Step 3:** Estimate  $\beta_0$  and the associated 95% confidence interval with weighted least squares

## Raw data from 76 RCTs: Financial education treatment effects

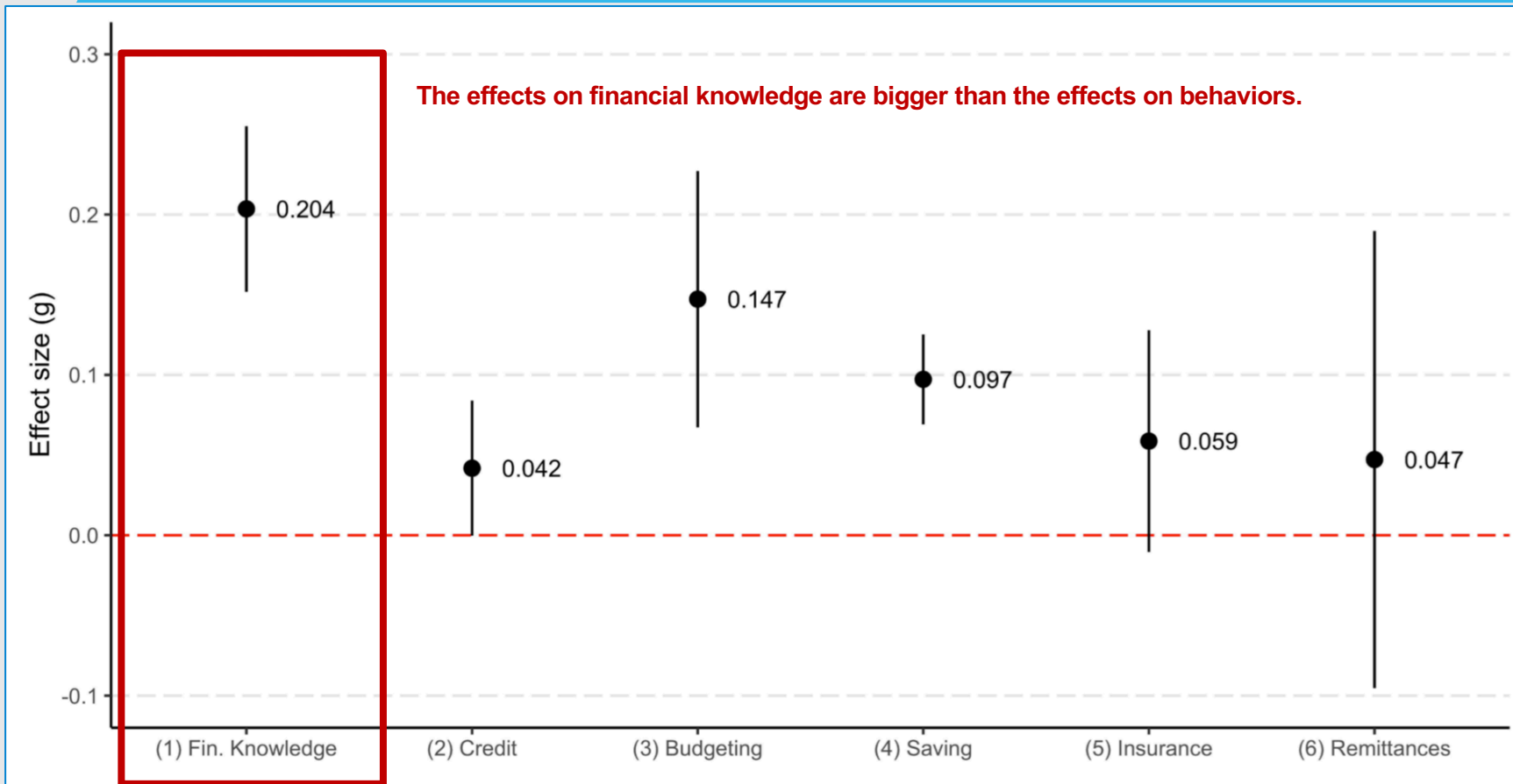


## Comparison the new evidence to the result in Fernandes et al. (2014)

### Treatment effects on financial behaviors



## Treatment effects by outcome domain



## How big are the effects?

- Effects of financial education on *financial knowledge* are comparable to studies on math and reading (Hill et al. 2008; Cheung and Slavin 2016; Fryer 2016).
- Effects of financial education on *financial behaviors* are comparable to meta-analyses of interventions in other domains
  - anti-smoking (Rooney & Murray 1996)
  - tailored printed health interventions (Noar et al. 2017)
  - energy conservation (Karlin et al. 2015)

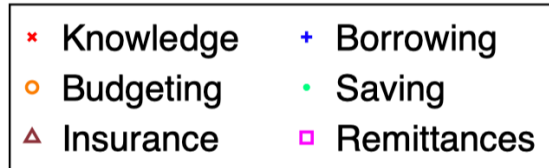
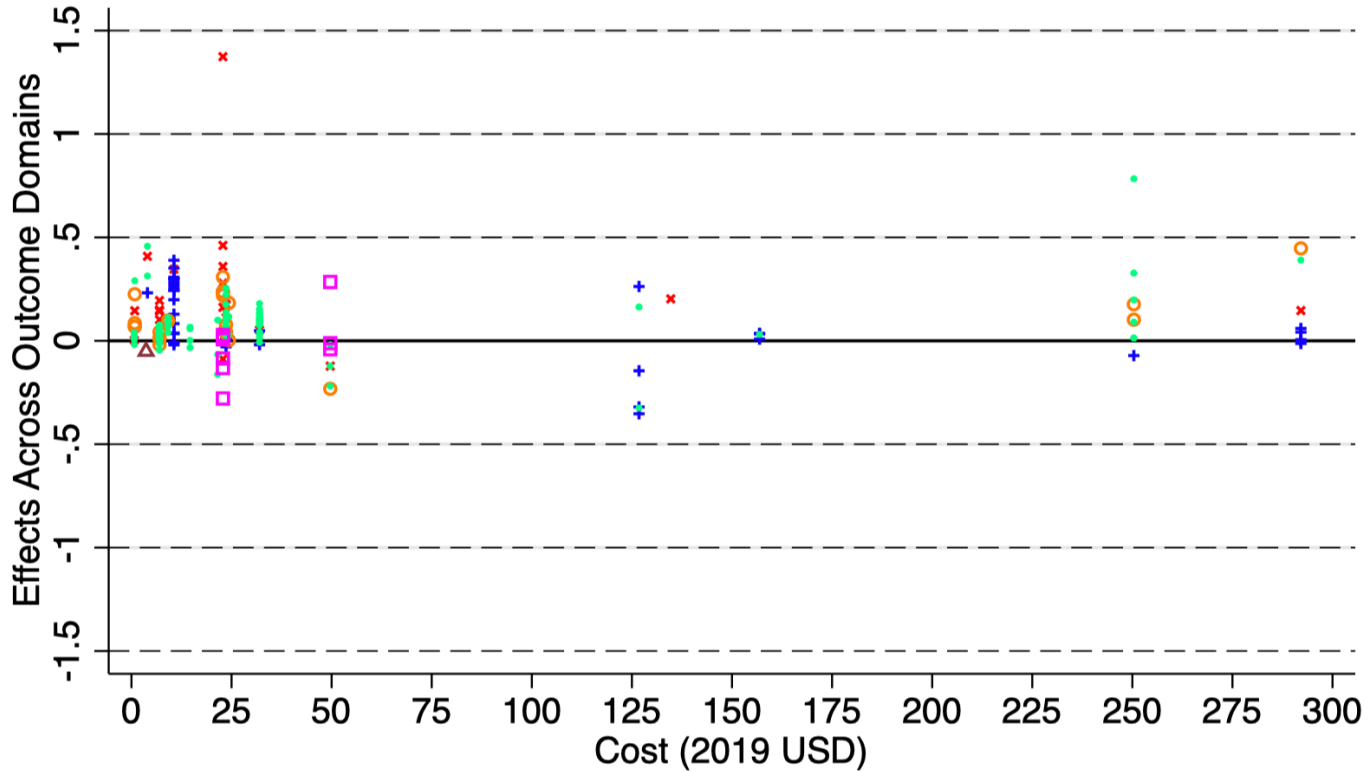
## A scheme for interpreting effect sizes from causal studies (Kraft 2018)

		Cost-Effectiveness Ratio (ES/Cost)		
		Cost Per Pupil		
Effect Size		Low ( $< \$500$ )	Moderate (\$500 to $< \$4,000$ )	High (\$4,000 or $>$ )
	Small ( $< .05$ )	Small ES / Low Cost	Small ES / Moderate Cost	Small ES / High Cost
	Medium ( $.05$ to $< .20$ )	Medium ES / Low Cost	Medium ES / Moderate Cost	Medium ES / High Cost
	Large ( $.20$ or $>$ )	Large ES / Low Cost	Large ES / Moderate Cost	Large ES / High Cost

Notes: ES = Effect Size

(Kraft 2018, p. 20)

## Costs and effect sizes of financial education interventions



## Are interventions cost-effective?

- Using Kraft's (2019) scale of educational interventions, effects are "medium/large."
- Average intervention has low cost per participant (mean costs are \$60.40 and median costs are \$22.90)
- With the data we have, for "medium effect sizes," Kraft's educational intervention scale would say average cost per participant of \$60 implies "low cost."



## Subgroup analyses

Subgroup	Effect size (g)	SE	95% CI Lower bound	95% CI Upper bound	n(Studies)	n(effects)
<i>Panel A: Treatment effects on financial behaviors</i>						
<i>(a) By country income</i>						
High income economies	0.1127	0.0316	0.0478	0.1777	32	129
Developing economies	0.0928	0.0130	0.0660	0.1195	32	329
<i>(b) By respondent income</i>						
Low income individuals	0.0993	0.0194	0.0600	0.1387	43	367
General population	0.1035	0.0219	0.0571	0.1500	21	91
<i>(c) By age of participants</i>						
Children (< age 14)	0.0640	0.0186	0.0188	0.1091	9	36
Youth (age 14 to 25)	0.1203	0.0415	0.0250	0.2155	11	92
Adults (> age 25)	0.1068	0.0205	0.0653	0.1483	44	330
<i>(d) By type of publication</i>						
Top econ. journals	0.0833	0.0235	0.0325	0.1342	15	161
Other publications	0.1075	0.0183	0.0704	0.1445	49	297
<i>(e) By delay between treatment and measurement of outcomes</i>						
Delay of < 6 months	0.0991	0.0169	0.0645	0.1337	34	180
Delay of ≥ 6 months	0.0710	0.0137	0.0425	0.0995	28	260
Delay of ≥ 12 months	0.0878	0.0200	0.0450	0.1308	18	134
Delay of ≥ 18 months	0.0653	0.0192	0.0209	0.1098	10	49
Delay of ≥ 24 months	0.0574	0.0225	0.0013	0.1136	7	32

## Findings among sub-groups (1st block of the table)

- No significant differences between high-income and developing economies (effects on behavior)
- No significant differences between low-income individuals and general population
- No differences across publications (if in top journals or not)
- Financial education works for all age groups

## Do the effects decay over time? (2nd block of the table)

- Different from the initial meta-analysis (Fernandes et al 2014), we find **no evidence to support or refute decay** of effects 6 months or more after the intervention.
- Note that their *prediction* was based on a very small sample of studies.
- The effect on financial knowledge is estimated to be positive after more than one year in 5 studies.
- The effect on behavior is estimated to be positive after more than two years after intervention in 7 studies

## Main takeaways

- 1) Financial education works! Recent work shows clear evidence of positive effects of financial education on financial behaviors (+knowledge)
  - Statistical effect size is at three times as large as the effect in Fernandes et al. (2014)
  - It may be up to five times as large (when allowing for between-study heterogeneity in true effects)
  - Robust to a lot of different approaches to meta-analysis and even when accounting for publication selection for statistical significance
- 2) Policy recommendations should be based on economic effect sizes, not statistical effect sizes
- 3) No evidence of “rapid decay” but no evidence against it either

We need:

- more research on the long-term effectiveness of financial education programs
- more evidence on large-scale financial education programs
- more work on the cost-effectiveness of programs
- an academic journal dedicated to research on financial literacy and financial education (financial literacy is officially a field indexed in the JEL)

- Now more than ever, people need to have the knowledge and skills to navigate the financial landscape (“sailing lessons show their worth during a storm”)
- It is important for families to be financially resilient to shocks, both big and small
- Financially resilient families will contribute to a more financially resilient society
- Financial education programs can help achieve that goal!

## It is time to build a financially resilient society!



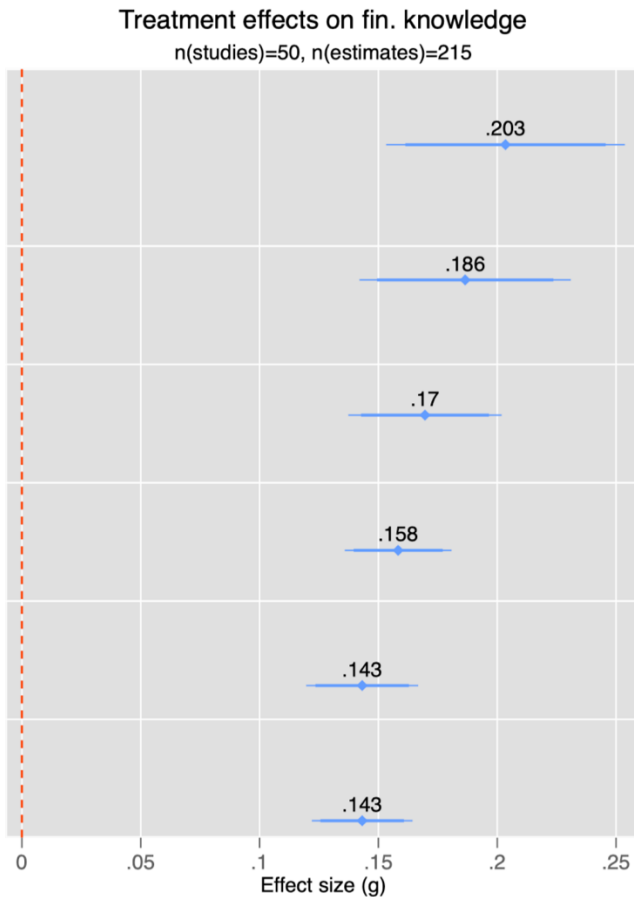
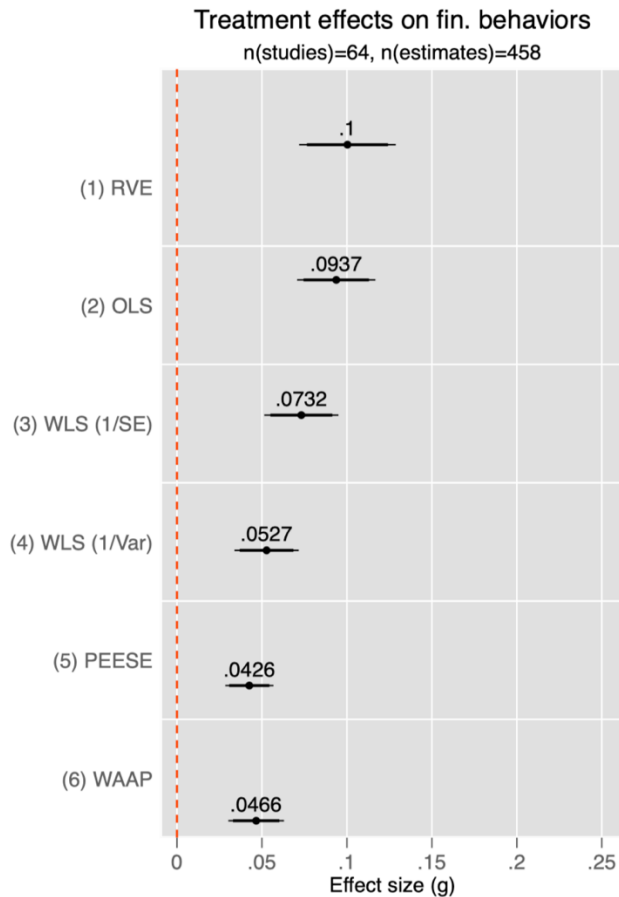
Source: <https://www.motherjones.com/food/2020/04/these-photos-show-the-staggering-food-bank-lines-across-america/>

**Thank you!**



**Additional slides**

## Results are robust to choosing lots of different models and also when correcting for publication selection bias



## Rapid decay in effects?

	(1) Effect size ( <i>g</i> )
Intensity	0.0043 (0.0024)
Intensity × Intensity	-0.0000 (0.0000)
Delay	-0.0018 (0.0052)
Delay × Delay	-0.0000 (0.0002)
Intensity × Delay	-0.0001 (0.0003)
n (Studies)	52
n (Effect sizes)	419

Note: This table reruns the main analysis of the result presented in Figure 4 in Fernandes et al. (2014) with updated data. Intensity is (mean-centered) number of hours of instruction, Delay is delay between treatment and measurement of outcomes in months. Results from RVE (random-effects assumption). Robust standard errors in parentheses. Assumed  $\rho = 0.8$ . Estimated  $\tau^2=0.0111$ .

- Standard errors for the coefficients are very large, so there is a lot of uncertainty around this prediction.
- Even more so if you have a very small set of observations, as in Fernandes et al. (2014)

## Economic vs. statistical significance

- Fernandes et al. (2014) effect size measure creates the illusion of miniscule effects, when they can be economically significant.
  - “variance explained” is a misleading concept
  
- Consider the following example:
  - Median effect of structured pedagogy interventions in developing countries = 0.13 SD units. (Evans et al. 2019)
  - In the Fernandes et al. (2014) metric: this intervention explains 0.36% of the variance in learning outcomes.
    - Seems small?
  - Evans et al. (2019) report that this effect = ~0.6 years of “business as usual schooling”
  - In separate analysis they estimate the returns to literacy in Kenya. The net present value of this intervention is 1,338 USD at an average annual income of 1,079 USD in 2015 PPP.
    - Economically, this effect appears to be large.

## External Validity

- There are concerns that RCTs may have limited external validity.
- This study increases the number of individuals in the interventions from Fernandes, Lynch, and Netermeyer (2014) from 23,000 to over 140,000.
  - But what about scale?
- Findings are consistent with recent work studying post-2000 state-mandated financial education in U.S. high schools that relies upon quasi-experimental research. (Brown et Al, 2016; Harvey, 2019; Urban et Al, 2018; Stoddard and Urban, 2019)
- Findings also consistent with large-scale RCTs, such as the school-based RCTs (e.g., Frisancho (2018))

## Call for papers: *Journal of Behavioral and Experimental Finance*

### Call for Papers

for a special Issue of the Journal of Behavioral and Experimental Finance, titled

“Recent developments in financial literacy and financial education”



The [Journal of Behavioral and Experimental Finance](#) (JBEF) is calling for paper submissions for a special issue titled “Recent developments in financial literacy and financial education.” This special issue will collect innovative work in both financial literacy and financial education research. We particularly welcome submission of papers addressing the following topics:

- Experimental and quasi-experimental impact evaluations of financial education programs (e.g., in primary and secondary schools, colleges and universities, workplaces, or online)
- Behavioral lab or lab-in-the-field experiments testing mediation effects of financial literacy on behaviors
- Empirical research documenting the causal effect of financial literacy on investment behavior and outcomes
- Observational studies addressing potential endogeneity of financial literacy through novel identification strategies (such as new instrumental variables or new econometric models)
- Papers studying measurement models and survey questions measuring financial literacy, including international surveys and knowledge of specific topics (taxes, pensions, etc).

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