

Evaluating Financial Competence

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June 24, 2016

TIAA Institute Fellows Symposium

Motivation

- Low financial literacy throughout the world raises concerns about the quality of financial decision making
- Financial education aims to improve decisions by helping consumers acquire the basic knowledge and skills needed to understand their choices
- Yet it is also possible that financial education alters behavior through other mechanisms: *indoctrination, exhortation, deference to authority, social pressure, and/or psychological anchors*
- These concerns are especially acute for workplace financial education, which tends to be *brief*, focusing on *simple heuristics* & *motivating messages* (*engaging, memorable, actionable*)

Critical question

- Are the behavioral effects of financial education in fact helpful or harmful?
- Existing tools for evaluating the quality of financial decision making have significant limitations
 - *Structural models*: require heroic assumptions
 - *WARP/GARP consistency*: does not detect misconceptions
 - *Dominance*: limited applicability; avoidance of dominated choices neither necessary nor sufficient for welfare improvements

Contributions of research agenda:

- ***First***, introduce new methods for evaluating the quality of financial decision making
- ***Second***, use these methods to evaluate educational interventions

Essence of the approach

- Examine *equivalent pairs of simply framed and complexly framed valuation tasks*
- A *valuation task* elicits a value $V(i)$ for which the consumer exhibits indifference between i , a financial instrument, and $\$V(i)$ immediately
 - Assessing $V(i)$ involves preferences, and is not simply a math problem
 - Standard approach is to use multiple price lists
- A valuation task is *simple framed* if the individual is provided with a description of a payoff profile
 - Example: $V(s) = \text{WTP for } \$24 \text{ in } 30 \text{ days}$
- A valuation task is *complexly framed* if the Individual is provided with a description of an instrument that produces the payoff profile
 - Example: $V(c) = \text{WTP } \$10 \text{ invested @ } 3\%/\text{day (compounded) for } 30 \text{ days}$

Equivalence

- The instruments s and c are *equivalent* if they generate the same return profile (and thereby create the same consumption opportunities)
- If an individual understands the financial principles behind the equivalence between two instruments s and c , then we should observe $V(s) = V(c)$
- $|V(s) - V(c)|$ and $(V(s) - V(c))^2$ are intuitively appealing measures of financial competence
- They also have precise welfare Interpretations (based on Bernheim and Rangel, “Beyond Revealed Preference,” *QJE*, 2009)

Welfare Interpretation

A Working Assumption: People understand decisions with simple framing but not necessarily those with complex framing

- Tautological if people consume income when they receive it
- Paper explore alternative assumptions and empirical corroboration

Maximal Welfare Loss: $|V(s) - V(c)|$

Expected Welfare Loss:

- To a 2nd order approximation, proportional to $(V(s) - V(c))^2$
- With uniformly distributed prices (as in our experiment), this formula is exact

Benefits of the approach

Why evaluate financial competence based on *pairs of equivalent simple and complexly framed valuation tasks*?

- Paternalistic judgments are avoided
- Yields quantitatively precise and rigorously justifiable welfare measures
- Imposes modest information requirements (no need for parametric models of choice)
- Simple, intuitive, and easily implemented

Summary of first completed study (compound interest)

- Contributions:
 - Documents pitfalls of the types of brief rhetoric-laden interventions commonly used in workplace
 - Demonstrates that conventional methods of evaluation may fail to detect their deficiencies
- According to conventional measures, a representative financial education intervention appears to have the desired effects
 - Substantial improvement in measured financial literacy
 - Subjects report using newly gained knowledge in decisions
 - WTPs for interest-bearing assets change in a direction that counteracts a known bias
- In fact, the intervention does not improve the quality of financial decision making

Possible explanation

- Subjects interpret motivational rhetoric as substantive advice, which overwhelms any effects of improved knowledge
- We investigate this possibility through partial interventions (rhetoric-only, substance-only)
 - Effects on *financial literacy* and *self-reported decision strategies* are primarily attributable to *substance*
 - Effects on *actual financial choices* are primarily attributable to *motivational rhetoric*
 - The effect of motivational rhetoric on WTPs for interest-bearing assets doesn't depend on the individual's initial bias
 - Exclusively substantive instruction has some effect on behavior: reduces reliance on simple interest calculations, but does not migrate people to correct calculations

New application: risk and portfolio allocation

- Another core topic in most financial education courses
- Despite conceptual complexity, generally taught in short modules focusing on heuristics and simple motivational messages (“diversify, diversify, diversify”)
- Do these interventions improve portfolio decisions, or are they too blunt and simplistic? Do they, for example, indiscriminately reinforce the 1/N heuristic?

Structure of Experiment

1. Initial financial literacy quiz (standard)
2. Educational intervention: Narrated video based on section on compound interest from a leading book on personal financial planning
3. Decision problems
4. Survey questions, including test on compound interest

Structure of Experiment

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Description of the intervention

- Standard treatment of portfolio allocation, based on section from a popular self-help book
- Starts with motivation: story of an Enron secretary who invested all retirement funds in Enron and lost everything
- Explains:
 - Concepts of average return and variability of returns
 - How diversification reduces risk
 - The link between the correlation structure of the assets in a portfolio and risk reduction
- Control: video on compound interest

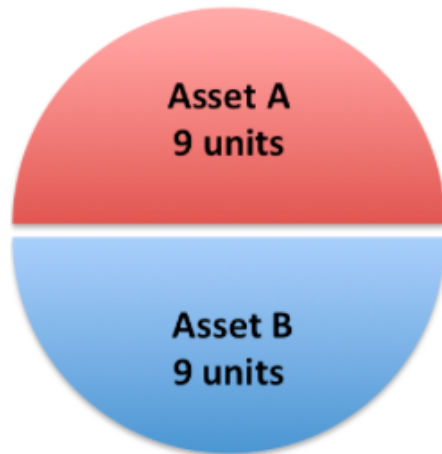
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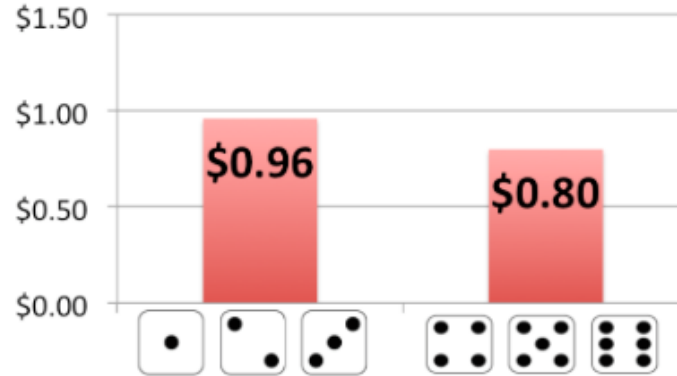
- Elicit valuations for 20 future rewards (10 equivalent pairs)
- Two versions:
 - Stylized – simple (2 to 3 states), we control the risk profile
 - Naturalistic - based on actual returns to 5 broad stock portfolios over 36 years

Stylized, complex framing

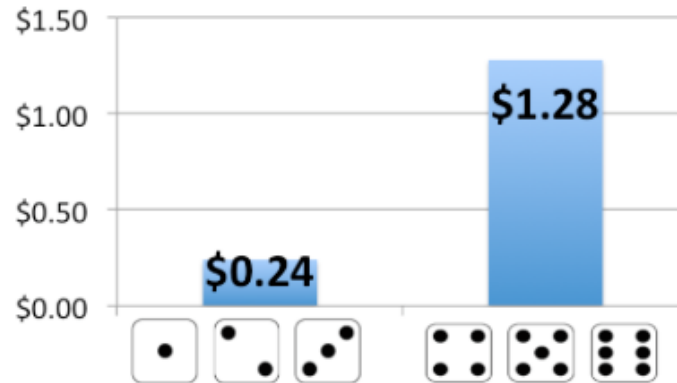
Portfolio 1



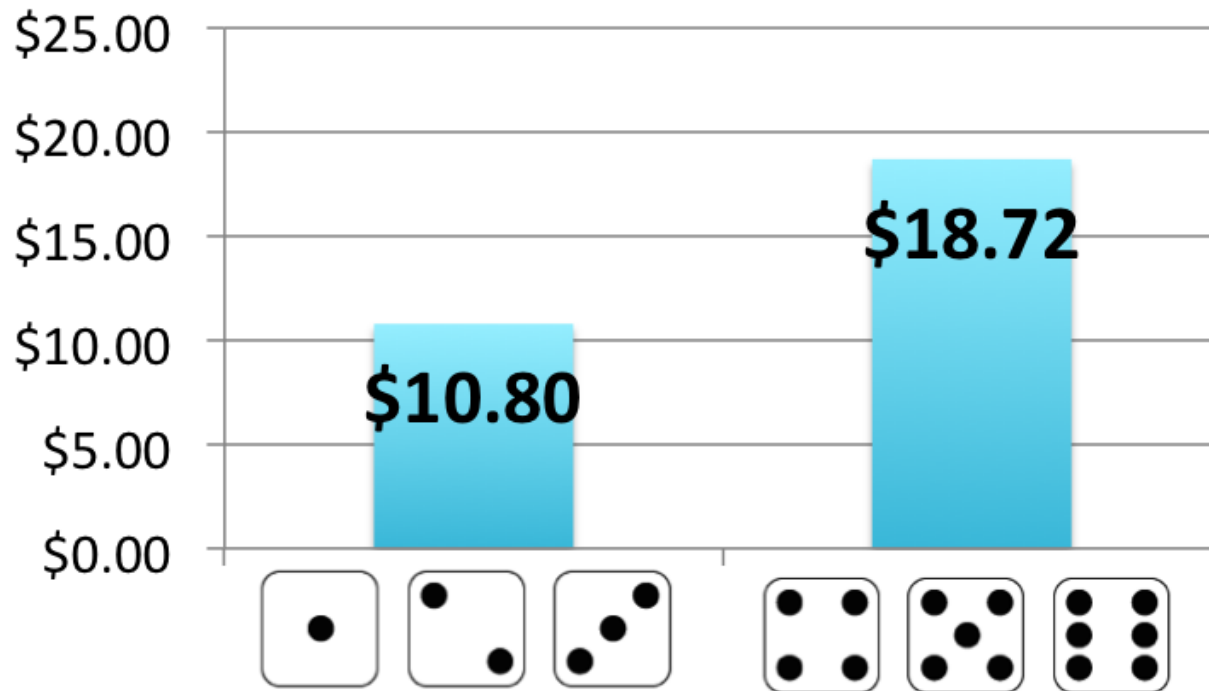
Each Unit of Asset A



Each Unit of Asset B



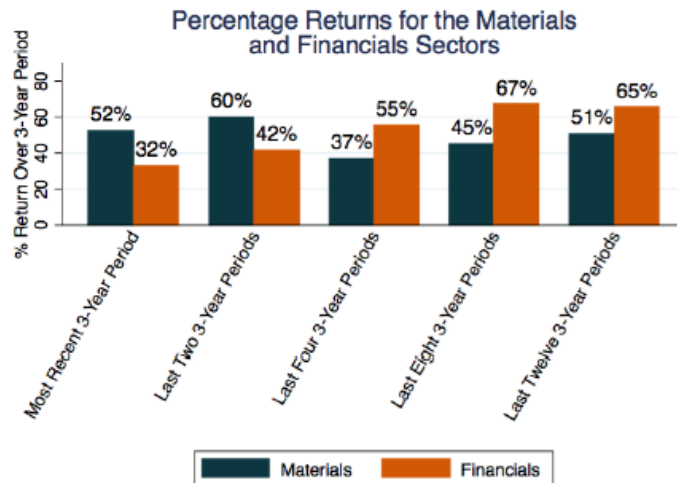
Stylized, simple framing



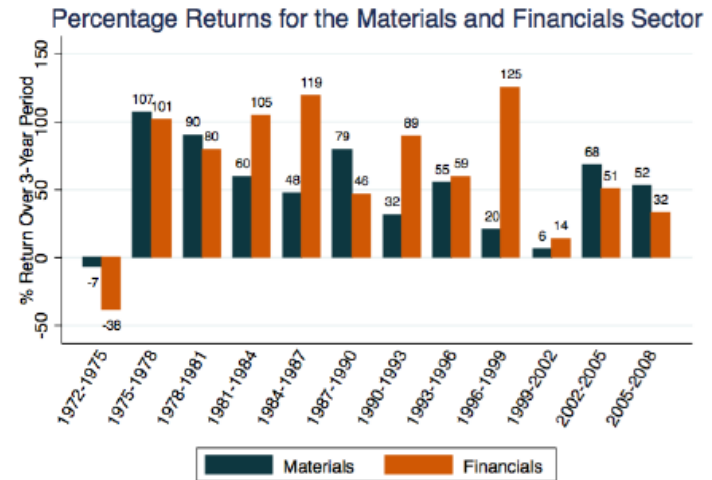
Naturalistic, complex framing

1 of 12 three-year periods selected at random; subject earns actual portfolio returns

Materials and Financials Sectors

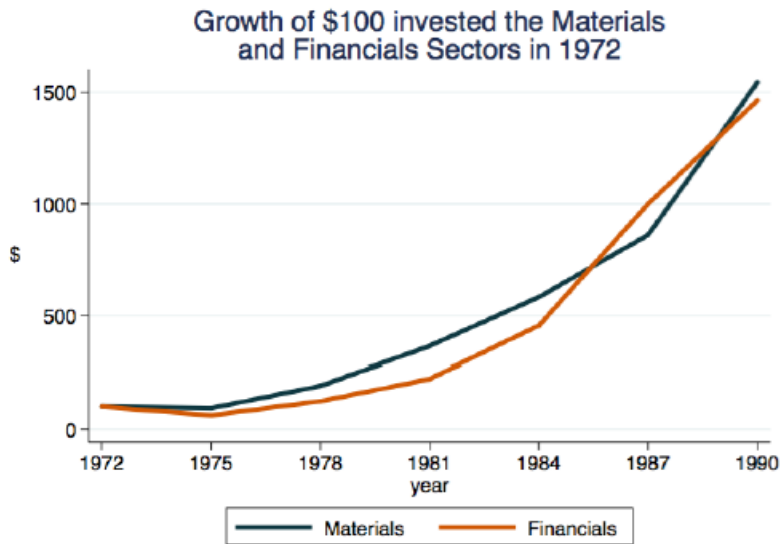


The first pair of bars in this figure show you what you would have earned if you invested in the materials and financials sectors for the most recent period (2005-2008). The second pair of bars show the average of three year percentage returns for the materials and the financials sectors for the most recent period (2005-2008) and the second most recent period (2002-2005), and so on. The last pair of bars show the average percentage return of the materials and financials sectors over 3 years for the last 12 three-year periods.

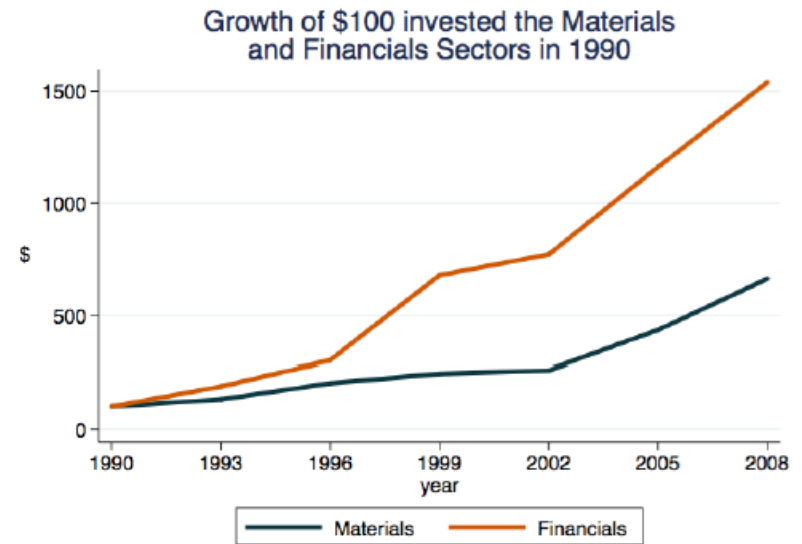


The first pair of bars in this figure show what you would have earned if you bought the stocks in the materials or financials sectors at the beginning of 1972 and sold the stocks at the beginning of 1975. The second pair of bars show what you would have earned if you bought the stocks in the materials or financials sectors at the beginning of 1975 and sell the stocks at the beginning of 1978, and so on. The last pair of bars show what you would have earned if you bought the stocks in the materials or financials sectors at the beginning of 2005 and sold the stocks at the beginning of 2008.

Naturalistic, complex framing



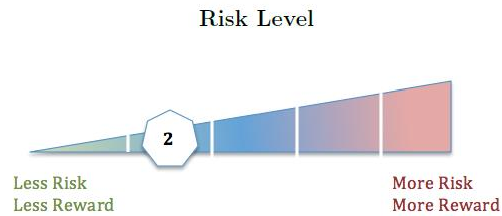
This figure shows how \$100 invested in the materials or financials sectors in 1972 would have grown over 18 years (until the beginning of 1990).



This figure shows how \$100 invested in the materials or financials sectors in 1990 would have grown over 18 years (until the beginning of 2008).

Naturalistic, complex framing

Materials Sector



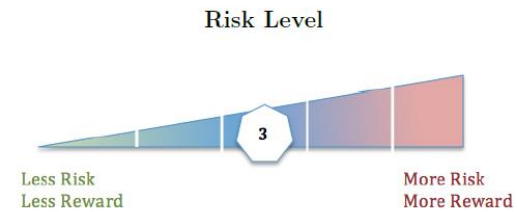
Portfolio Composition (As of December, 2007)

Characteristics	
Number of Stocks	65
Total Assets	\$492 billion
Total Assets of Ten Largest Holdings	\$263 billion

Ten Largest Holdings (53.46% of total assets as of December, 2007)	
1	Dow Chemical
2	Freeport-McMoran
3	Alcoa Inc
4	E.I. du Pont de Nemours
5	International Paper
6	Genentech Inc
7	U.S. Steel
8	Newmont Mining
9	Praxair
10	Monsanto

Click [here](#) to see the all of the companies in the materials sector as of December, 2007.

Financials Sector



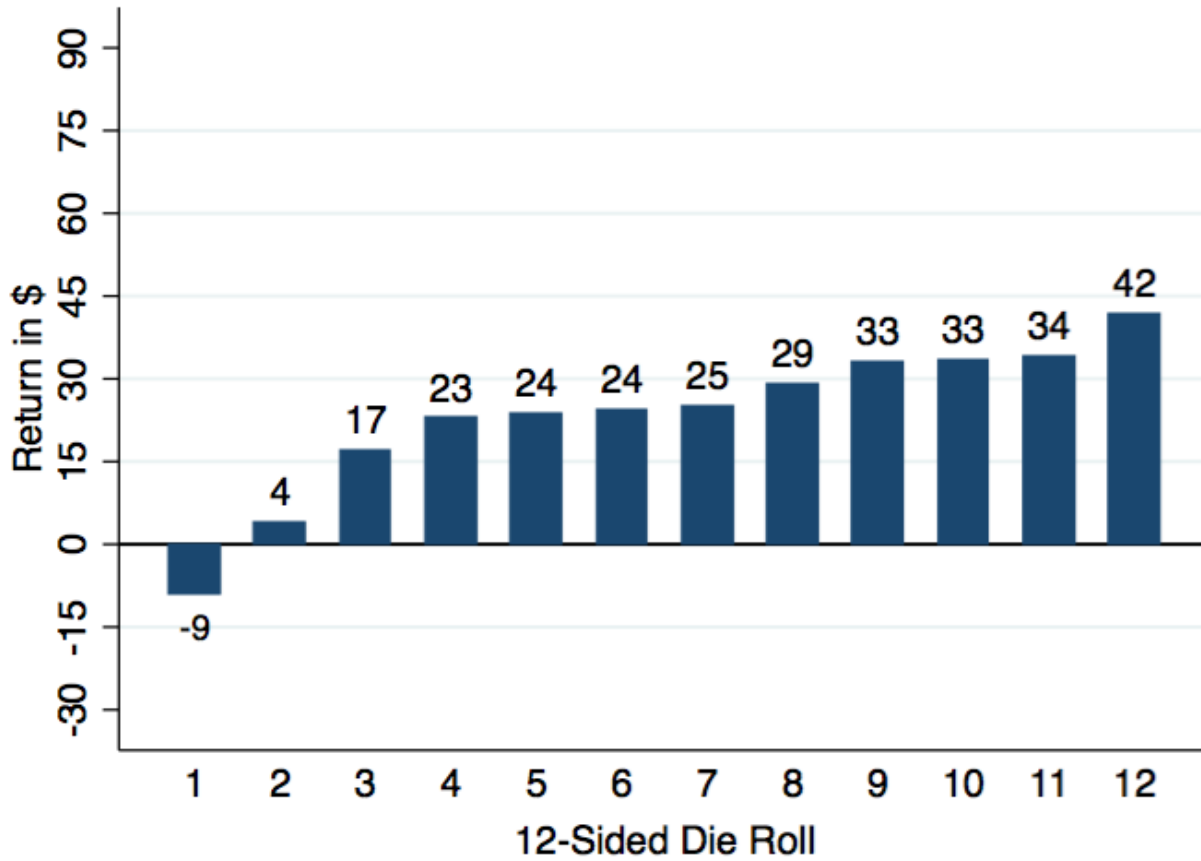
Portfolio Composition (As of December, 2007)

Characteristics	
Number of Stocks	68
Total Assets	\$19.13 trillion
Total Assets of Ten Largest Holdings	\$12.17 trillion

Ten Largest Holdings (63.63% of total assets as of December, 2007)	
1	Citigroup
2	Bank of America
3	J.P. Morgan Chase & Co.
4	Goldman Sachs
5	American International Group
6	Morgan Stanley
7	Merrill Lynch
8	Fannie Mae
9	Freddie Mac
10	Wachovia Corp.

Click [here](#) to see the all of the companies in the financials sector as of December, 2007.

Naturalistic, simple framing



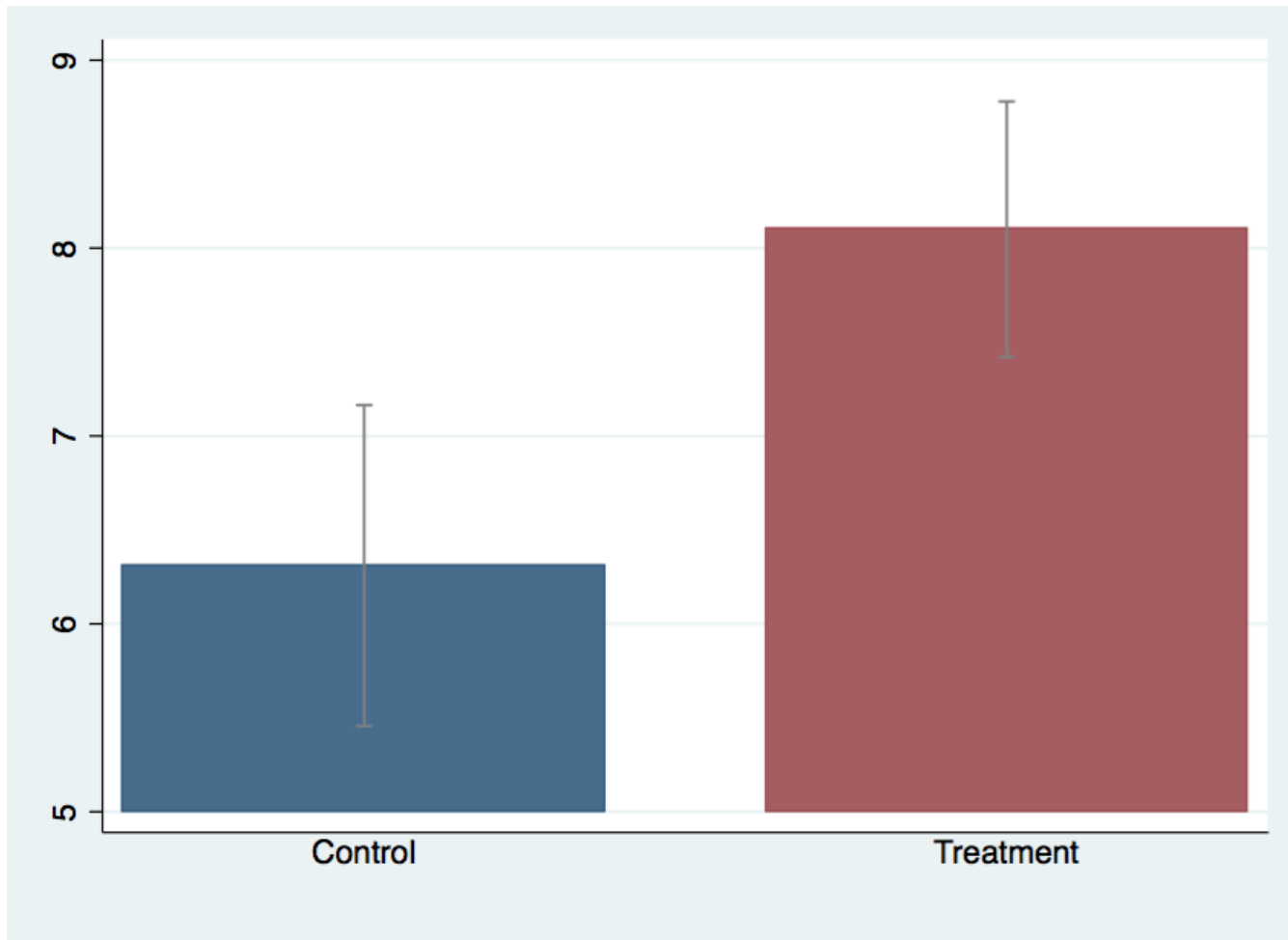
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Results (pilot data)

Results

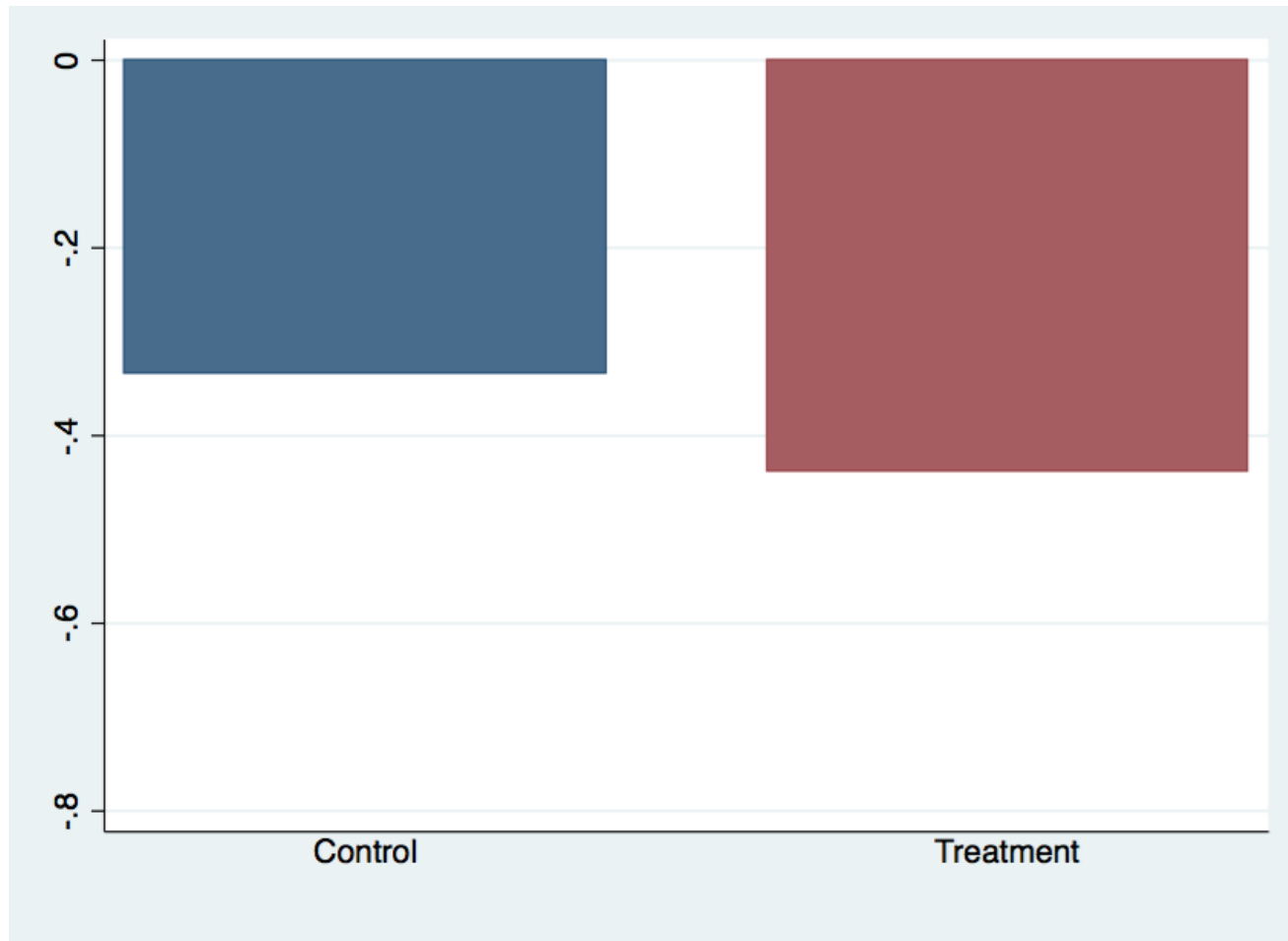
Test Scores



Educational intervention significantly improves measured financial literacy

Results, Stylized Tasks

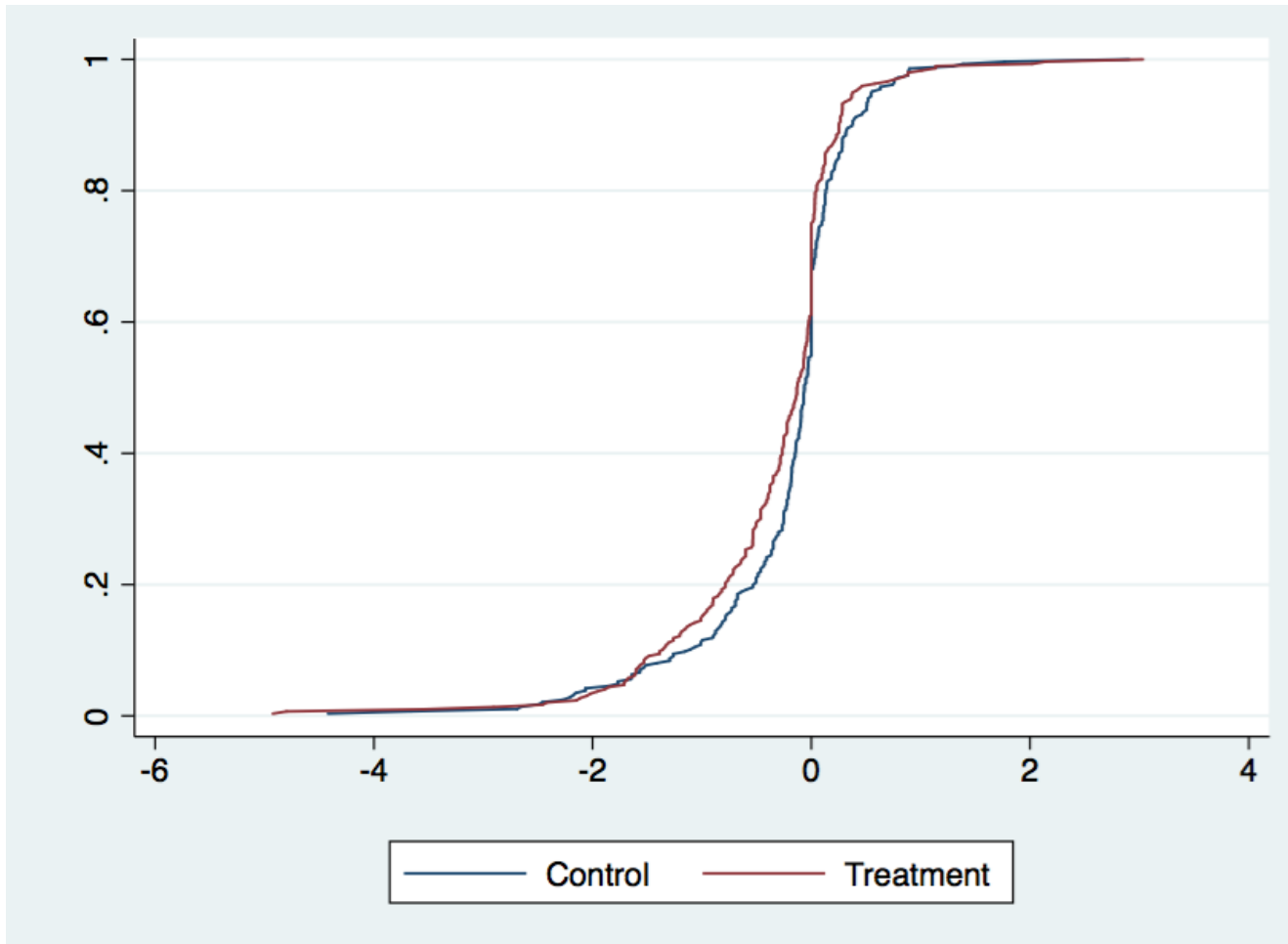
Average of $V^{complex} - V^{simple}$



Subjects undervalue complexly framed options, and educational intervention magnifies this bias.

Results, Stylized Tasks

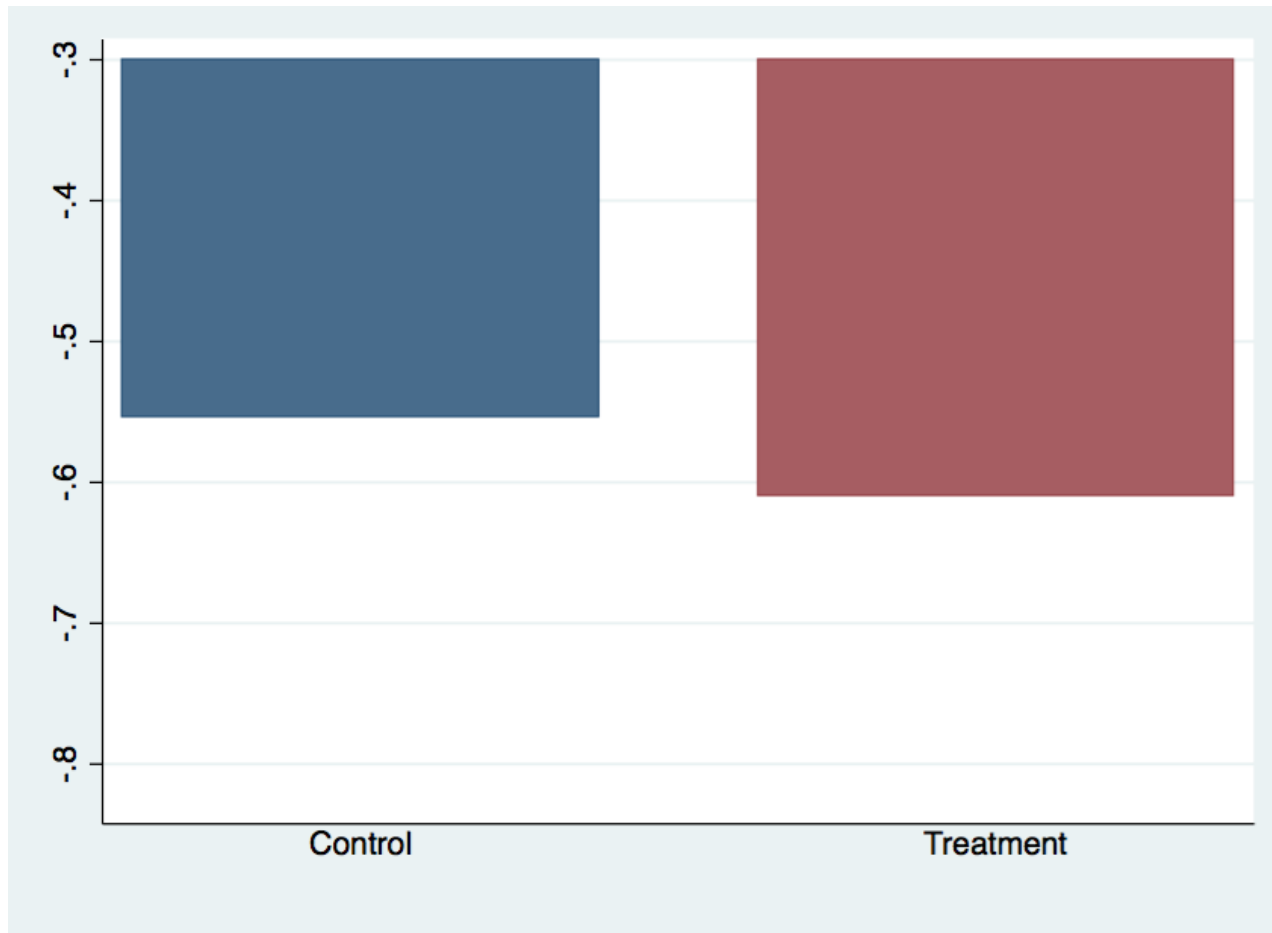
Distribution of $V^{complex} - V^{simple}$



Educational intervention magnifies undervaluing of complexly framed options

Results, Stylized Tasks

Average Financial Competence: $|V^{complex} - V^{simple}|$



Educational intervention reduces measured financial competence

Naturalistic version

- Initial implementation had a glitch that obscures the interpretation of the results
- One reasonably clear finding: financial education increases the valuations for equally weighted portfolios when complexly framed, but not when simply framed
- Points to possibility that education may inappropriately increase reliance on $1/N$ heuristic

What about professional advice?

- Most people don't get it
 - Aon-Hewitt: median utilization rates for one-on-one counseling in 401(k) plans is 6%
- Open questions:
 - Does education help people understand whether they need professional advice?
 - To what extent are professionally advised choices influenced by the advisor's preferences, rather than the investor's preferences?

What's next?

- Completion of “toolkit” (diagnostic tasks on multiple topics)
- Field applications