Trust, Financial Literacy, and Financial Market Participation

RAND BeFi Conference
Washington, DC

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This paper represents the authors’ views and not the views of the Investment Company Institute, its staff, or member firms.
Introduction – when it comes to saving and investing

Changes in the structure of retirement pensions are motivating people to increase their financial market participation.

Market participation decisions have economic consequences.
  » If you don’t save, you won’t have as much money for retirement.
  » If you don’t invest, you sacrifice potential gains.

Given these facts, we ask:
  » What is the role of trust in motivating participation?
  » How does it compare with the role of financial literacy?
  » Do the two act in the same way or do they act differently?
Motivation

why might trust and financial literacy matter for financial market participation?

A willingness to participate in financial markets is key for investing.

We posit that trust may factor into willingness, and also, that trust might differ from understanding of markets.

So, we explore how trust and financial literacy may be related to the way individuals choose to participate in financial markets.
Outline

1. Survey and measures
2. Trust – background and measures
3. Financial literacy – measures and thoughts
4. Financial market participation – three dependent variables
5. Results
6. Conclusions
Survey and measures

Survey environment –
  design: Qualtrics
  sample: MTurk “Experts” | user-scripts

Survey development –
  **trust**: literature, our own work
  **financial literacy**: 10 questions. Big three and seven others we pre-tested
  **financial market participation**: three measures – we’ll come back to these
  additional survey items – controls & attention check
Trust – background: one general measure, over time

evolving responses to a general trust question

Generally speaking, would you say that most people can be trusted or that you can’t be too careful in dealing with people?

➔ This works. Using this question, we find that more trusting types:
  - engage in more financial market participation,
  - and delegate more, to humans.

... but we care more about how financial professionals are considered, so...
Trust – our measure of trust in people

measures of specific types of people

This average is very neutral and works much like the GSS question.
Trust in attributes of engagement

situational measures

More trusting
Neutral
Less Trusting

Wall Street is stacked against the average investor (-)
Advisors help clients with complex products
Advisors offer complex products to justify high fees (-)
It is good to give advisors your financial information

This average is very near our financial advisor result
We build on literature testing the efficacy of questions:

- Knoll and Houts (2012) – Item Response Theory
- Schmeiser and Seligman (2013) – External Validity
- Lusardi, Mitchell, and Curto (2014) – PRIDIT

> All ordinal ranking techniques.

and work with a Mechanical Turk sample

- Fisch, Wilkinson-Ryan, and Firth (2016)

We evaluate the relative merit of an increasingly standard battery of survey questions as a first exercise in Mechanical Turk. ➔ We pick the ‘Big Three’ and seven others.
Trust in people (composite) & financial literacy

score on financial literacy quiz

level of trust

neutral level of trust

October 3, 2019
Trust in financial advisors & financial literacy

- Neutral level of trust
- Tend to trust

Score on financial literacy quiz

Level of trust

N

160
140
120
100
80
60
40
20
0
Financial Market Participation

For financial market participation:

-i- we consider how many types of investment-capable accounts a person has, building on the work of Balloch, Nicolae & Phillip (stock mkt.)
{1. DC, 2. IRA, 3. SEP, 4. other retirement, 5. full-service broker, 6. discount broker, 7. college account}

Two other measures of participation:

-ii- preferences for degree of delegation of investment decisions
-iii- preferences for advisors: human vs. algorithm (robo)
Financial Market Participation

*those with max number of account types differ*

Average Trust Across all Types of People

- Level of trust vs. number of account types
- SD+ and SD- symbols indicate standard deviation

Financial Literacy

- Score on quiz vs. number of account types
- SD+ and SD- symbols indicate standard deviation
Outline revisited

1. Survey and measures
2. Trust – background and measure
3. Financial literacy – measures and thoughts
4. Financial market participation – three dependent variables
5. Results
6. Conclusions

→ Onward to results!
## Results

<table>
<thead>
<tr>
<th></th>
<th>trust in: people</th>
<th>market attributes</th>
<th>financial literacy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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<td><strong>-i- Number of account types:</strong></td>
<td>+</td>
<td>-</td>
<td>- , +</td>
</tr>
<tr>
<td>Poisson</td>
<td>trust in: weakest types</td>
<td>disagree fee motive</td>
<td>linear , sqr</td>
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<tr>
<td></td>
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<td></td>
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<tr>
<td><strong>-ii- Degree of delegation:</strong></td>
<td>+ , -</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Ordered Probit</td>
<td>trust in: ER, adviser, self</td>
<td>assist w. complexity</td>
<td>linear</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>-iii- Affinity for human (vs. robo):</strong></td>
<td>+</td>
<td>+</td>
<td>+ , -</td>
</tr>
<tr>
<td>Ordered Probit</td>
<td>trust in: adviser, self</td>
<td>assist w. complexity</td>
<td>linear , sqr</td>
</tr>
</tbody>
</table>
Conclusions

**Trust:** linear, positively correlated with all sorts of engagement

**Financial Literacy:** more complex, but the relationships make basic sense

One final fact about the two is interesting as well:
people holding max number of account types: highest trust, lowest literacy

- Investments in literacy are valuable for countering naive version of trust
- **Basic:** associated with affinity for human advisors, fewer types of accounts
- **More Substantial:** associated with increased financial market participation
Thank you to take away

Market participation decisions have economic consequences.
» Trust and financial literacy each contribute to participation decisions.

Please contact us with further questions or comments:

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Heterogeneous Responses to Interest Rate Price Disclosures

Mary Zaki
University of Maryland
Interest Rate Price Disclosure

- Interest rates standard method to communicate price on credit
- Auto loans, Payday loans
  - APR (Interest Rate)
  - Finance Charge (Dollars)
- Credit Cards, Lines of Credit
  - APR only
- Assumption: Consumers can translate interest rate price disclosures into future credit cost obligations
Questions:

- Can consumers translate interest rate price disclosures into credit cost obligations?
- How does the isolated channel of interest rate price disclosure comprehension impact purchasing and borrowing decisions?
Quasi-field Experiment

- Recruited participants from online labor market
  - 1,477 participants
  - February 2017
  - Complete experiment remotely

- Simulate natural information environment: No restrictions on using outside help or tools

- Real-stakes: 1/30 chance choices materialize
You will receive $5 a month for 13 months with the first payment starting in one month.

You can use some of the money from your income stream to purchase one of these specially priced Amazon Gift Cards:

- Value: $12.50, Price: $10.00
- Value: $25.00, Price: $20.00
- Value: $37.00, Price: $30.00
- Value: $50.00, Price: $40.00
- Value: $62.50, Price: $50.00
## Credit Plans

### Interest Rate

**CREDIT PLAN**

*Step 1: Look up the price of the Gift Card. This will be the Credit Balance in the first month.*

<table>
<thead>
<tr>
<th>Price</th>
<th>Dollar Finance Charge</th>
</tr>
</thead>
<tbody>
<tr>
<td>$10.00</td>
<td>$5</td>
</tr>
<tr>
<td>$20.00</td>
<td>$5</td>
</tr>
<tr>
<td>$30.00</td>
<td>$5</td>
</tr>
<tr>
<td>$40.00</td>
<td>$5</td>
</tr>
<tr>
<td>$50.00</td>
<td>$5</td>
</tr>
</tbody>
</table>

*These payments will be automatically withdrawn from your income stream. The CREDIT BALANCE in each subsequent month after the first month is calculated by first adding a service fee of 1.5% of the previous month's credit balance to the previous month's credit balance and then subtracting the monthly withdrawal amount (listed in the second column of the table above). If the summation of the previous month's credit balance plus the service fee is smaller than the monthly withdrawal amount, then only the previous month's credit balance plus the service fee will be withdrawn. The first withdrawal starts in one month.*

### Dollar Finance Charge

**CREDIT PLAN**

*Step 2: Add the one-time service fee listed below to the PRICE of the Gift Card to calculate your starting Credit Balance.*

<table>
<thead>
<tr>
<th>Price</th>
<th>Dollar Finance Charge</th>
</tr>
</thead>
<tbody>
<tr>
<td>$10.00</td>
<td>$0.23</td>
</tr>
<tr>
<td>$20.00</td>
<td>$0.78</td>
</tr>
<tr>
<td>$30.00</td>
<td>$1.68</td>
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<tr>
<td>$40.00</td>
<td>$2.94</td>
</tr>
<tr>
<td>$50.00</td>
<td>$4.58</td>
</tr>
</tbody>
</table>

*These payments will be automatically withdrawn from your income stream. If the remaining credit balance in any one month is less than the monthly payment, you will only pay the remaining balance from your income stream. The first withdrawal starts in one month.*
### Historical Relevance

#### Spiegel 1956 Spring/Summer Catalog

<table>
<thead>
<tr>
<th>UNPAID BALANCE (Total amount, less down payment, if any)</th>
<th>Carrying charge</th>
<th>MONTHLY PAYMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>$10.00 to $12.50</td>
<td>$1.25</td>
<td>$5</td>
</tr>
<tr>
<td>12.51 to 15.00</td>
<td>1.50</td>
<td></td>
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<tr>
<td>15.01 to 20.00</td>
<td>2.00</td>
<td></td>
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<tr>
<td>20.01 to 25.00</td>
<td>2.50</td>
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<tr>
<td>25.01 to 30.00</td>
<td>3.00</td>
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<tr>
<td>30.01 to 40.00</td>
<td>4.00</td>
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<tr>
<td>40.01 to 50.00</td>
<td>5.00</td>
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<tr>
<td>$50.01 to $60.00</td>
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<td>$60.01 to $70.00</td>
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<td>$9</td>
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<td>$100.01 to $110.00</td>
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<td>110.01 to 120.00</td>
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<td>$270.01 to $280.00</td>
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<td>$280.01 to $290.00</td>
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<td>$290.01 to $300.00</td>
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<td>$600.01 to $610.00</td>
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<td>67.00</td>
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<td>$670.01 to $680.00</td>
<td>68.00</td>
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<td>$680.01 to $690.00</td>
<td>69.00</td>
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<tr>
<td>$690.01 to $700.00</td>
<td>70.00</td>
<td></td>
</tr>
<tr>
<td>$700.01 to $710.00</td>
<td>71.00</td>
<td></td>
</tr>
<tr>
<td>$710.01 to $720.00</td>
<td>72.00</td>
<td></td>
</tr>
</tbody>
</table>

#### Spiegel 1962 Fall/Winter Catalog

Budget Power Table

- **Budget Power** buys up to 50% MORE for the same monthly payment!

<table>
<thead>
<tr>
<th>Monthly Payment</th>
<th>Unpaid Balance (Total amount, less down payment, if any)</th>
<th>Monthly Payment</th>
<th>Unpaid Balance (Total amount, less down payment, if any)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FOR ONLY</strong></td>
<td><strong>YOU CAN BUY</strong></td>
<td><strong>FOR ONLY</strong></td>
<td><strong>YOU CAN BUY</strong></td>
</tr>
<tr>
<td>$5</td>
<td>$100</td>
<td>$16</td>
<td>$350</td>
</tr>
<tr>
<td>$6</td>
<td>$120</td>
<td>$17</td>
<td>$400</td>
</tr>
<tr>
<td>$7</td>
<td>$140</td>
<td>$18</td>
<td>$430</td>
</tr>
<tr>
<td>$8</td>
<td>$160</td>
<td>$19</td>
<td>$460</td>
</tr>
<tr>
<td>$9</td>
<td>$180</td>
<td>$20</td>
<td>$480</td>
</tr>
<tr>
<td>$10</td>
<td>$200</td>
<td>$21</td>
<td>$500</td>
</tr>
<tr>
<td>$11</td>
<td>$220</td>
<td>$22</td>
<td>$530</td>
</tr>
<tr>
<td>$12</td>
<td>$240</td>
<td>$23</td>
<td>$550</td>
</tr>
<tr>
<td>$13</td>
<td>$260</td>
<td>$24</td>
<td>$580</td>
</tr>
<tr>
<td>$14</td>
<td>$280</td>
<td>$25</td>
<td>$600</td>
</tr>
<tr>
<td>$15</td>
<td>$310</td>
<td>$30</td>
<td>$720</td>
</tr>
</tbody>
</table>

ORDERS OVER $720. For monthly payments on balances of more than $720, or to request a larger Credit Trust Fund, please write us. Your Prudential Life Insurance protects you on any balance up to $1,000.

*SERVICE CHARGE. There are no carrying charges. Instead a small service charge of 1 1/4%, minimum 50¢, will be added to your opening balance each month.
Decision Question

Which Amazon Gift Card would you like to purchase if any? Please select one choice below:

- Not Interested in purchasing Amazon Gift Card at any time.
- Value: $12.50; Price: $10
- Value: $25; Price: $20
- Value: $37; Price: $30
- Value: $50; Price: $40
- Value: $62.50; Price: $50

How would you like to make the purchase? Please select one choice below:

- SAVING: Receive Amazon Gift Card after saving up enough money to purchase it.
- CREDIT: Use credit plan and receive Amazon Gift Card today.
Assume that you will be receiving $5 for 13 months with your first payment starting in one month.

If you are interested in purchasing the following Amazon Gift Card:

![amazon gift card](image)

Value: $50.00
Price: $40.00

and you are planning to purchase it using the following credit plan:

**CREDIT PLAN**

<table>
<thead>
<tr>
<th>Step 1: Look up the price of the Gift Card</th>
<th>Step 2: Add the one-time service fee listed below to the PRICE of the Gift Card to calculate your starting Credit Balance.</th>
<th>Step 3: Pay the amount listed below Every Month Until your credit balance is 0*</th>
</tr>
</thead>
<tbody>
<tr>
<td>$10.00</td>
<td>$0.56</td>
<td>$5</td>
</tr>
<tr>
<td>$20.00</td>
<td>$1.94</td>
<td>$5</td>
</tr>
<tr>
<td>$30.00</td>
<td>$4.27</td>
<td>$5</td>
</tr>
<tr>
<td>$40.00</td>
<td>$7.77</td>
<td>$5</td>
</tr>
<tr>
<td>$50.00</td>
<td>$12.63</td>
<td>$5</td>
</tr>
</tbody>
</table>

* These payments will be automatically withdrawn from your income stream. If the remaining credit balance in any one month is less than the monthly payment, you will only pay the remaining balance from your income stream. The first withdrawal starts in one month.

Then how many months will it take you to pay off your credit balance? For example, if your credit balance will be equal to 0 in one month from today, then your answer is "1". Please type your response in the box below:
Calculation Question
Response

<table>
<thead>
<tr>
<th>Interest Rate: Base</th>
<th>Interest Rate: APR</th>
<th>Interest Rate: Focus On</th>
<th>Dollar Finance Charge</th>
</tr>
</thead>
<tbody>
<tr>
<td>lt 8 months</td>
<td>8 months</td>
<td>9 months</td>
<td>gt 10 months</td>
</tr>
<tr>
<td>0</td>
<td>0.2</td>
<td>0.4</td>
<td>0.6</td>
</tr>
</tbody>
</table>

Percent of Participants
Calculation Question
Response Time

<table>
<thead>
<tr>
<th>Seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
</tr>
<tr>
<td>60</td>
</tr>
<tr>
<td>120</td>
</tr>
<tr>
<td>180</td>
</tr>
<tr>
<td>240</td>
</tr>
<tr>
<td>300</td>
</tr>
<tr>
<td>360</td>
</tr>
</tbody>
</table>

- Interest Rate: Base
- Interest Rate: APR
- Interest Rate: Focus On
- Dollar Finance Charge

Diagram showing the response times for different interest rates and charges, with markers indicating correct and incorrect responses.
Finding #1

- Consumers *cannot*, rather than *do not*, translate interest rates into cost obligations.
- True even with effort, incentives, and no limitations on utilizing outside help and even with simplest version of line of credit.
### Intensive Margin

<table>
<thead>
<tr>
<th>Borrowed Amount per Borrower</th>
<th>Purchased amount per Purchaser</th>
</tr>
</thead>
<tbody>
<tr>
<td>42.00 Dollars</td>
<td>42.00 Dollars</td>
</tr>
<tr>
<td>44.00 Dollars</td>
<td>44.00 Dollars</td>
</tr>
<tr>
<td>46.00 Dollars</td>
<td>46.00 Dollars</td>
</tr>
<tr>
<td>48.00 Dollars</td>
<td>48.00 Dollars</td>
</tr>
<tr>
<td>APR</td>
<td>APR</td>
</tr>
<tr>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>18%</td>
<td>18%</td>
</tr>
<tr>
<td>42%</td>
<td>42%</td>
</tr>
</tbody>
</table>

#### Graphs

**Borrowed Amount per Borrower**
- **Dollar Finance Charge**
- **Interest Rate**

**Purchased amount per Purchaser**
- **Dollar Finance Charge**
- **Interest Rate**
- **No Credit**
Underconsumption Suggestive Evidence

% of Participants in Dollar Finance Charge Credit Arm who use credit by Response to Calculation Question

% of Participants in Dollar Finance Charge Credit Arm who make purchase by Response to Calculation Question

** * 0.20 0.30 0.40 0.50 0.60
Percent

0% 18% 42%

Correct response Incorrect response

** * 0.60 0.70 0.80 0.90
Percent

0% 18% 42%

Correct response Incorrect response
Underconsumption Suggestive Evidence

% of Participants in Interest Rate Arms who use credit by Response to Calculation Question

% of Participants in Interest Rate Arms who make purchase by Response to Calculation Question

---

Underconsumption Suggestive Evidence

Percent correct response Incorrect response

Percent correct response Incorrect response
Finding #2

- Interest rate price disclosures lead some to non-optimally avoid credit
- Interest rate price disclosures lead some to non-optimally consume credit
- Significant impacts even in simplified setting in which there is only one singular way to pay off credit
Conclusion and Discussion

- Even in its simplest form, consumers cannot translate interest rate price disclosures into cost obligations
  - Support findings in financial literacy and marketing literature (Lusardi and Mitchell, 2011, 2017; Lusardi and Tufano, 2015; Soll, Keeney and Larrick, 2013)

- If the costs were to become more salient:
  - some convenience users could borrow/consume more
  - some borrowers could borrow/consume less

- Use of interest rates to inform borrowers on cost obligations ineffective
  - TILA disclosures not sufficient

- Increased salience of costs needs to occur before, not after, purchasing decisions
  - CARD act bill disclosures too late

- Possible solutions:
  - Financial education
  - Disclosures on statements that predict interest costs based on spending
  - return to installment credit (AMEX) + pre-purchase calculators
American Express: Pay it/Plan it Feature

Split up large purchases over time for a fixed monthly fee and no interest.
Pre-Purchase Calculator

Select an amount to see what monthly payment plan options could be available on the Card. This calculator is an illustrative tool only. It is not based on your personal creditworthiness or other factors. Your actual plan options and fees will be presented to you when you create a plan.

$500

<table>
<thead>
<tr>
<th>Payments of</th>
<th>Includes a monthly plan fee of</th>
<th>Includes a monthly plan fee of</th>
<th>Includes a monthly plan fee of</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>$87.49</td>
<td>$45.85</td>
<td>$31.94</td>
</tr>
<tr>
<td>12</td>
<td>$4.15</td>
<td>$4.18</td>
<td>$4.16</td>
</tr>
<tr>
<td>18</td>
<td>Total cost $524.90</td>
<td>Total cost $550.16</td>
<td>Total cost $574.88</td>
</tr>
<tr>
<td></td>
<td>for a total plan fee of $24.90</td>
<td>for a total plan fee of $50.16</td>
<td>for a total plan fee of $74.88</td>
</tr>
</tbody>
</table>
Credit Prices Upon Adopting Interest Rate Disclosures
Credit vs. Cash Sales for Less Efficient Firms

Panel A: Spiegel

Panel B: Aldens

First Mention of Revolving Credit in Annual Report

Sales ($ in Millions)


Total Sales  Credit Sales  Cash Sales
Talking About The Weather: Understanding Household Demand for Green Investments

Anders Anderson  David T. Robinson

Swedish House of Finance, Stockholm School of Economics
Duke University and NBER

AARP/RAND Behavioral Finance Symposium
Is Climate Change Real?
Source: Michael Greenstone, Energy Policy Institute @ U of Chicago

January 22, 2019

New Poll: Nearly Half Of Americans Are More Convinced Than They Were Five Years Ago That Climate Change Is Happening, With Extreme Weather Driving Their Views
The Heat Wave of 2014
Average July Temperatures

DTR (Duke, NBER) Climate Change and Green Investment
Retiring in Sweden

The Current System
Green Becomes Red Hot

[Graph showing changes in non-ESG labeled funds, ESG labeled funds, articles on "Climate Change", and high temperature records over years from 1999 to 2017.]

- Non-ESG labeled funds increase from 100% in 1999 to approximately 949% in 2017.
- ESG labeled funds show a similar trend, starting at 0% in 1999 and reaching 949% in 2017.
- Articles on "Climate Change" show a steady increase from 0 in 1999 to over 1000 in 2017.
- High temperature records show a significant increase from 0 in 1999 to over 900 in 2017.

DTR (Duke, NBER) Climate Change and Green Investment
This Paper

Use local severity of the weather shock of 2014 to explore the demand for green investment

- Link behavioral survey responses to administrative data on demographics and portfolio holdings
  - Financial and environmental literacy, beliefs, overconfidence
  - Actual portfolio holdings and trades

- Distinguish between potential mechanisms for the result:
  - Knowledge of environmental processes (short science test)
  - Changes in beliefs about the returns to green investment
  - Changes in the moral imperative of green investment
  - Fear of future environmental calamities
Roadmap

- **Data Construction**
  - Survey: Knowledge and beliefs
  - Premium pension plan data
  - Demographics / registry data

- **Results**
  1. Weather affected certain attitudes towards the environment in the cross-section
     - Link climate fears to disruptive weather conditions
     - Weather does not appear to affect other motivations for green investment
  2. Attitudes affected actual investment behavior
     - Climate fears drive people to hold ESG funds
     - More pronounced for all (100%) ESG portfolios compared to some (<50%, >0%)
     - Fears explain portfolio holdings and trades after 2014, but not before
Sampling Strategy

Survey 20,000 Swedes through Statistics Sweden

- Mailer contains instructions and a link to a website
- 4,117 responses (21%), 3,667 remain (18%) after matching

Survey contains different types of questions:

▶ Financial Literacy Questions  
  - Standard Lusardi/Mitchell HRS questions (the Big 5) modified to the Swedish context as in Anderson and Robinson (2018)
  - Replace mortgage question with question built around “Rule of 72”

▶ Environmental Literacy Questions  
  - Our own test built in the same spirit (3 questions: Biology, 2: Energy Efficiency)
For the previous five multiple choice questions, you could have answered between zero and five correctly. We would like to know how many you think you got correct. Please assign a probability for each possible outcome below.

Enter whole numbers and total should add to 100.

<table>
<thead>
<tr>
<th>Probability</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability that I have all five correct</td>
<td>0 %</td>
</tr>
<tr>
<td>Probability that I have exactly four correct</td>
<td>0 %</td>
</tr>
<tr>
<td>Probability that I have exactly three correct</td>
<td>0 %</td>
</tr>
<tr>
<td>Probability that I have exactly two correct</td>
<td>0 %</td>
</tr>
<tr>
<td>Probability that I have exactly one correct</td>
<td>0 %</td>
</tr>
<tr>
<td>Probability that I have no correct answers</td>
<td>0 %</td>
</tr>
<tr>
<td>Don't know</td>
<td></td>
</tr>
<tr>
<td>Prefer not to answer</td>
<td></td>
</tr>
</tbody>
</table>

Total: 0 %
Additional Survey Questions

Beliefs about the future—How likely are the following over the next 20 years:

- Average temperatures will rise by 1 degree centigrade
- Global food shortages will occur
- World sea level will rise by 1 meter

Use monetary and ethical motives to invest green as controls

- Think that green investments outperform (Pecuniary)
- A green planet is more important than financial well-being (Non-Pecuniary)
Scientific consensus

Temperature change

Global mean temperature near-term projections relative to 1986–2005

Figure by Ed Hawkins
Share of the population that is undernourished

This is the main FAO hunger indicator. It measures the share of the population that has a caloric intake which is insufficient to meet the minimum energy requirements necessary for a given individual. Data showing as 5 may signify a prevalence of undernourishment below 5%. Regional aggregations are based on World Bank regions and exclude high-income countries. They may therefore differ from UN FAO regional figures.
Scientific consensus

Sea level rise

[Graph showing sea level rise with scenarios A1B, A1T, A1FI, A2, B1, and B2, with notes on model average and uncertainty envelopes.]
Climate calamities

Climate calamities: "In the next 20 years..."

- The average temperature on earth increases more than one Centigrade
- Food shortage increases
- The world sea level rises more than one meter

Don't know: 3%
Very unlikely: 2%
Unlikely: 3%
Neither Likely or Unlikely: 11%
Likely: 41%
Very likely: 39%

DTR (Duke, NBER) Climate Change and Green Investment
Other motives

- Pecuniary: "Environmentally sustainable investments generate higher returns in the long run"
- Non-Pecuniary: "A clean planet is more important than higher economic welfare"
Roadmap

- Data Construction
  - Behavioral survey
  - Premium pension plan data
  - Demographics

- Results

1. Weather affected certain attitudes towards the environment in the cross-section
   - Link climate fears to disruptive weather conditions
   - Weather does not appear to affect other motivations for green investment

2. Attitudes affected actual investment behavior
   - Climate fears drive people to hold ESG funds
   - More pronounced for all ESG portfolios
   - This only true for portfolio holdings and trades after 2014, but not before
1. Weather and Attitudes towards Climate

Key identification assumption is that exposure to weather calamities affected attitudes

- Using 2014 as an “event” *assumes* the identification mechanism

- Instead vary intensity based on geographic proximity to weather calamities
  - Map respondents to closest of 100 weather stations
  - Look at numbers of Class 1 & more severe Class 2 warnings in the area
  - Look separately removing snow

- Connect geographic proximity to fears, pecuniary and non-pecuniary beliefs
### Results

#### Weather and Attitudes

1. **Weather Exposure (Probits)**

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1) Calamities</th>
<th>(2) Calamities</th>
<th>(3) Calamities</th>
<th>(4) Calamities</th>
<th>(5) Pecuniary</th>
<th>(6) Non-Pec.</th>
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<tbody>
<tr>
<td>Warnings 2</td>
<td>0.013**</td>
<td>0.016***</td>
<td>0.002</td>
<td>0.010*</td>
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<td></td>
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<tr>
<td></td>
<td>(0.006)</td>
<td>(0.006)</td>
<td>(0.004)</td>
<td>(0.005)</td>
<td></td>
<td></td>
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<tr>
<td>Warnings 1</td>
<td>0.000</td>
<td>0.001</td>
<td>-0.000</td>
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<tr>
<td></td>
<td>(0.001)</td>
<td>(0.001)</td>
<td>(0.000)</td>
<td>(0.001)</td>
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<tr>
<td>Snow warnings</td>
<td>-0.192***</td>
<td>-0.008</td>
<td>0.058</td>
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<tr>
<td></td>
<td>(0.040)</td>
<td>(0.029)</td>
<td>(0.041)</td>
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<td></td>
<td></td>
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<tr>
<td>Perceived Env. Lit.</td>
<td>0.043***</td>
<td>0.044***</td>
<td>0.044***</td>
<td>0.029***</td>
<td>0.030***</td>
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<tr>
<td></td>
<td>(0.011)</td>
<td>(0.011)</td>
<td>(0.011)</td>
<td>(0.008)</td>
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<td>Perceived Fin. Lit.</td>
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<td>-0.000</td>
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<td>(0.011)</td>
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<td>(0.009)</td>
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<tr>
<td>Env. Lit.</td>
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<td>0.009</td>
<td>0.008</td>
<td>0.009</td>
<td>0.013*</td>
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<tr>
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<td>(0.010)</td>
<td>(0.010)</td>
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<td>(0.010)</td>
<td>(0.007)</td>
<td>(0.009)</td>
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<tr>
<td>Fin. Lit.</td>
<td>0.024***</td>
<td>0.015</td>
<td>0.015</td>
<td>0.015</td>
<td>-0.012</td>
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<td>(0.008)</td>
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<td>Controls</td>
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<td>Yes</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1
## 2. Trades Before and After the 2014 Heat Wave

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1) Some Before HW</th>
<th>(2) Some After HW</th>
<th>(3) Most Before HW</th>
<th>(4) Most After HW</th>
<th>(5) All Before HW</th>
<th>(6) All After HW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calamities</td>
<td>-0.049**</td>
<td>0.029</td>
<td>-0.012</td>
<td>0.106**</td>
<td>-0.014***</td>
<td>0.083**</td>
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<tr>
<td></td>
<td>(0.023)</td>
<td>(0.038)</td>
<td>(0.009)</td>
<td>(0.044)</td>
<td>(0.005)</td>
<td>(0.037)</td>
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<td>Pecuniary</td>
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<td>0.014</td>
<td>-0.003</td>
<td>0.108</td>
<td>0.003</td>
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<tr>
<td></td>
<td>(0.031)</td>
<td>(0.059)</td>
<td>(0.015)</td>
<td>(0.075)</td>
<td>(0.009)</td>
<td>(0.062)</td>
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<td>Non-Pecuniary</td>
<td>0.085**</td>
<td>0.026</td>
<td>0.004</td>
<td>0.001</td>
<td>-0.002</td>
<td>-0.068*</td>
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<td></td>
<td>(0.036)</td>
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<td>(0.012)</td>
<td>(0.055)</td>
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<td>Fee diff.</td>
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<td>-0.022</td>
<td>-0.210*</td>
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<td></td>
<td>(0.054)</td>
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<td>(0.024)</td>
<td>(0.116)</td>
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<td>Observations</td>
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<td>Year FE</td>
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<td>Yes</td>
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<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1
In Conclusion

The heat wave of 2014 affected attitudes towards green investment

- Some individuals came to believe that future environmental calamities were highly unlikely, even if scientific consensus might say otherwise
- These individuals tilted their portfolios towards “green mutual funds” after the heat wave but not before
- It did little to affect beliefs about the returns to green investment
- Or change the moral imperative of green investment

In a horse race of fear, knowledge and beliefs about returns:

- What people think they know about environmental and financial literacy is a far better gauge of their willingness to invest green than how much they actually know.
- Fears are far more important than actual or perceived knowledge for predicting whether someone is a “green investor"
Investor Behavior Discussion

Jeremy Burke
University of Southern California, Center for Economic and Social Research

RAND Behavioral Finance Forum
October 3, 2019
Trust, Financial Literacy, and Financial Market Participation

• Nice survey data eliciting a range of measures of
  – Trust
  – Financial literacy
  – Financial market participation
  – Preferences for form of financial advice

• Trust and financial literacy both impact financial market participation, in distinct ways
  – Trust (+)
  – Financial literacy (-/+)

Trust, Financial Literacy, and Financial Market Participation - Comments

• Number of accounts measure is a little tricky to interpret
  – Should one have seven equity accounts?
  – Consider binaries across account types

• Does financial literacy influence one’s ability to accurately report account ownership?
  – Individuals with low financial literacy more difficulty reporting correctly?
Trust, Financial Literacy, and Financial Market Participation – Policy Implications

• High trust in financial advisors:
  – More delegation
  – More use of human advice

• Low financial literacy:
  – More delegation
  – More use of human advice

• Intersection a bit concerning

• As robo-advisors become more prevalent, increasing need for a fiduciary rule?
Talking about the Weather

• Great administrative data (actual portfolio holdings and trades) linked to survey data

• Increased exposure to extreme weather led to:
  – Increased fear about climate catastrophes
  – Investments in green portfolios
    • No evidence driven by change in beliefs about returns
    • Weak evidence driven by change in moral views
    • Pattern occurred after 2014 (severe heat wave), but not before
Talking about the Weather - Comments

• Does exposure to calamities affect probability of switching out of the default?
  – Examine proportion of portfolio in ESG investments across all investors? Powered?

• Not change in beliefs about returns or morality, then why?
  – Belief that investing in green funds may reduce future climate calamities?
  – Other warm glow?
Talking about the Weather - Policy

• Individuals may have more difficulty making “rational” decisions when ancillary dimensions are important

• Doing the “right” thing for the “wrong” reason

• Can we shock beliefs on other dimensions to impact financial behavior?
  – Through exposure?
  – Through information campaigns?
Heterogeneous Responses to Interest Rate Disclosures

- Nice experiment directly testing impact of credit price disclosure methods on borrowing/purchasing decisions

- Form of disclosure is important
  - People really struggle with interest rates
  - Can distort decisions in both directions, inducing under- or over-borrowing
Heterogeneous Responses to Interest Rate Disclosures - Comments

• Price of credit not as saliently highlighted in the interest rate treatment?
  – Lower salience may increase both incorrect responses and correct answer response times (extra search costs)
  – (Significantly?) higher fraction in interest rate treatment report no cost of credit

• Underestimate credit costs, but use less?
  – Aversion to uncertainty?

• Heterogeneity correlated with demographic/financial characteristics?
Heterogeneous Responses to Interest Rate Disclosures - Policy

- Do the math for them!
  - People are bad at calculating (compound) interest
  - Situation studied is purposefully simplified, and correct responses directly incentivized, yet still difficulty
  - Dollar terms often easier to understand than percentages

- Apps/calculators may help (pre-purchase)

- Text messages (post-purchase)?