Heterogeneity, Financial Literacy and Asset Allocation:
A Study Using Experimental and Field Data

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The General Question: How do people allocate their retirement assets?

UBS Tactical Allocation Diagram
The General Question: How do people allocate their retirement assets?

Wells Fargo Retirement Asset Allocation Diagram
Our Data

- 1.8 Million TIAA Participants
- 17,334 Iowa TIAA Participants
- Iowa IPERS Participants
- Iowa Other Participants (8,870 total IPERS & Other)
- 620 Iowa Experiment Participants

1.8 Million TIAA Participants
**Allocation Stage Alternatives**

<table>
<thead>
<tr>
<th>Alternative</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Return</td>
<td>130%</td>
<td>185%</td>
<td>125%</td>
<td>200%</td>
<td>225%</td>
<td>190%</td>
</tr>
<tr>
<td>Low Return</td>
<td>30%</td>
<td>15%</td>
<td>-25%</td>
<td>-20%</td>
<td>-75%</td>
<td>-90%</td>
</tr>
<tr>
<td>Average Return</td>
<td>80%</td>
<td>100%</td>
<td>50%</td>
<td>90%</td>
<td>75%</td>
<td>50%</td>
</tr>
<tr>
<td>Range of Returns</td>
<td>100%</td>
<td>170%</td>
<td>150%</td>
<td>220%</td>
<td>300%</td>
<td>280%</td>
</tr>
<tr>
<td>Return/Risk Ratio</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.8000</td>
<td>0.5882</td>
<td>0.3333</td>
<td>0.4091</td>
<td>0.2500</td>
<td>0.1786</td>
</tr>
<tr>
<td>Uncategorised Rating</td>
<td>***</td>
<td>***</td>
<td>**</td>
<td>**</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Categorised Rating</td>
<td>***</td>
<td>**</td>
<td>*</td>
<td>***</td>
<td>**</td>
<td>*</td>
</tr>
</tbody>
</table>

- **Expected Return**
  - High Return: 130%, 185%, 125%, 200%, 225%, 190%
  - Low Return: 30%, 15%, -25%, -20%, -75%, -90%
  - Average: 80%, 100%, 50%, 90%, 75%, 50%
  - Range: 100%, 170%, 150%, 220%, 300%, 280%

- **Return/Risk Ratio**: 0.8000, 0.5882, 0.3333, 0.4091, 0.2500, 0.1786

- **Uncategorised Rating**: *** (High), *** (Very High), ** (High), ** (Very High), * (Low), * (Very Low)
- **Categorised Rating**: *** (Low), ** (Medium, Low), * (Medium, High), *** (High), ** (Very High), * (Very Low)

**Graph**

- **Expected Return** against **Standard Deviation**
- **Alternatives** A, B, C, D, E, F
- **Frontiers**: RA Eff. Frontier, RS Eff. Frontier
- **Legend**
  - Alternatives: A, B, C, D, E, F
  - RA Eff. Frontier: Green Line
  - RS Eff. Frontier: Red Line

**Notes**
- Cash is represented at 0% return and 0% standard deviation.
Faculty and staff behave similarly to students

![Bar chart showing average amount invested in different alternatives by students and faculty/staff.](image)

- Average Portfolio E(r)
- Average Portfolio sd(r)
- Average Sharpe Ratio
- Average Herfindahl Index
- Average Reallocation Index

Legend:
- **Students**
- **Faculty and Staff**
Demographics and Portfolio Efficiency

The graph illustrates the relationship between average (across trials) expected return and average (across trials) standard deviation. Two points, A and B, are marked on the graph, with A representing Men and B representing Women. The line Connecting these points represents the trade-off between return and standard deviation for each gender.
Demographics and Portfolio Efficiency

![Graph showing the relationship between average (across trials) expected return and average (across trials) standard deviation for married and not married marital status. Points A and B represent different data points. The graph includes labels for Married and Not Married.]
Demographics and Portfolio Efficiency

Average (across Trials) Expected Return vs. Average (across Trials) Standard Deviation

- Risk Averse
- Risk Seeking

Risk Preference Bet
Demographics and Portfolio Efficiency

![Graph showing the relationship between average (across trials) expected return and average (across trials) standard deviation. Points A and B represent different degrees: High School, Bachelor's, Master's, and Doctorate.]
Demographics and Portfolio Efficiency

Average (across Trials) Expected Return vs. Average (across Trials) Standard Deviation

- **Experience Index**

Points A and B represent different demographic or portfolio efficiency values. The graph shows a linear relationship between the expected return and the standard deviation.
Demographics and Portfolio Efficiency

Average (across Trials) Expected Return vs. Average (across Trials) Standard Deviation

- Points A and B
- Knowledge Score

Graph: Scatter plot with points labeled from 2 to 9.
Demographics, Knowledge and TIAA % Equity

Average Investment in Dominated Alternatives

Avg. % Allocated to Equity in TIAA (Non-Life-Cycle-Only Participants)
Demographics, Knowledge and TIAA % Equity

Average Investment in Dominated Alternatives

Avg. % Allocated to Equity in TIAA (Non-Life-Cycle-Only Participants)

Marital Status

- Married
- Not Married
Demographics, Knowledge and TIAA % Equity

Average Investment in Dominated Alternatives

Avg. % Allocated to Equity in TIAA (Non-Life-Cycle-Only Participants)
Demographics, Knowledge and TIAA % Equity

Average Investment in Dominated Alternatives

- High School
- Bachelor's
- Master's
- Doctorate

$-  $1.0  $2.0  $3.0  $4.0  $5.0  $6.0  $7.0  $8.0

Avg. % Allocated to Equity in TIAA (Non-Life-Cycle-Only Participants)

- High School
- Bachelor's
- Master's
- Doctorate

60%  65%  70%  75%  80%  85%  90%
Demographics, Knowledge and TIAA % Equity

Average Investment in Dominated Alternatives

Avg. % Allocated to Equity in TIAA (Non-Life-Cycle-Only Participants)

Experience Index
Demographics, Knowledge and TIAA % Equity

Average Investment in Dominated Alternatives

Avg. % Allocated to Equity in TIAA (Non-Life-Cycle-Only Participants)

Knowledge Score

Knowledge Score
We have significant correlations in behavior between experiment and TIAA portfolios

<table>
<thead>
<tr>
<th>Participants who ONLY Choose Life-Cycle Funds</th>
<th>Risk Pref. Bet</th>
<th>Self-Reported Experience</th>
<th>Knowledge Score</th>
<th>Experimental Portfolio Averages</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-0.0841</td>
<td>-0.1247</td>
<td>-0.1247</td>
<td>Expect. Return</td>
</tr>
<tr>
<td></td>
<td>(0.054)</td>
<td>(0.004)</td>
<td>(0.004)</td>
<td>Sharpe Ratio</td>
</tr>
<tr>
<td>% Equity in Allocation</td>
<td></td>
<td></td>
<td></td>
<td>Portfolio Concentration</td>
</tr>
<tr>
<td>% Guaranteed in Allocation</td>
<td>-0.1611</td>
<td>0.3279</td>
<td>0.2609</td>
<td>Investment in Dominated Assets</td>
</tr>
<tr>
<td></td>
<td>(0.007)</td>
<td>(0.000)</td>
<td>(0.000)</td>
<td></td>
</tr>
</tbody>
</table>

| Non-Life-Cycle Only Investors                |                |                          |                 |                                  |
| % Guaranteed in Allocation                    | -0.1657        | -0.1655                  |                 |                                  |
|                                               | (0.065)        | (0.002)                  |                 |                                  |
| % Equity in Allocation                        |                |                          |                 |                                  |
| % Guaranteed in Allocation                    | -0.1611        | 0.3279                   | 0.2609          |                                  |
|                                               | (0.007)        | (0.000)                  | (0.000)         |                                  |

| Tenure w. TIAA                               |                |                          |                 |                                  |
| Assets w/ TIAA                               | -0.1072        | 0.2272                   | 0.2128          |                                  |
|                                               | (0.074)        | (0.000)                  | (0.000)         |                                  |

| Participate in Supplemental Plan             | -0.1247        | 0.1991                   | 0.2097          |                                  |
|                                               | (0.036)        | (0.001)                  | (0.000)         |                                  |
Discussion

- **Subject pool validity**
  - In spite of large demographic differences, faculty and staff behavior mirrors student behavior in experiments overall

- **External validity**
  - Behavior in experiments and survey results correlated with TIAA portfolio behavior

- **Heterogeneity**
  - Different people, with different degrees of knowledge and expertise, with different backgrounds, in different life stages behave differently

- **Relatively low degree of patently suboptimal behavior in experiments**
  - Correlated with financial knowledge
  - Correlated with TIAA portfolio behavior