Peer Effects in Financial Decision Making: A Case of the Blind Leading the Blind?

Sandro Ambuehl,
University of Toronto and CESifo
Douglas Bernheim,
Stanford University
Fulya Ersoy,
Stanford University
Donna Harris
University of Oxford

2017 Cherry Blossom Financial Education Institute
The George Washington University School of Business
Washington, D.C., April 7
Motivation

People often consult non-expert advice for financial decisions  
(Lusardi, 2003, 2008; van Rooij et al., 2011; Lusardi and Mitchell, 2014; Bernheim, 1998)

Social interaction affects personal financial decision making  
(Beshears et al., 2015; Brown et al., 2014; Bursztyn et al., 2014; Cai et al., 2015; Duflo and Saez, 2003; Hvide and Ostberg, 2014; Hong et al., 2004, 2005; Kast et al., 2016; Ivkovic and Weisbenner, 2007)
Motivation

People often consult non-expert advice for financial decisions
(Lusardi, 2003, 2008; van Rooij et al., 2011; Lusardi and Mitchell, 2014; Bernheim, 1998)

Social interaction affects personal financial decision making
(Beshears et al., 2015; Brown et al., 2014; Bursztyn et al., 2014; Cai et al., 2015; Duflo and Saez, 2003; Hvide and Ostberg, 2014; Hong et al., 2004, 2005; Kast et al., 2016; Ivkovic and Weisbenner, 2007)

Are the effects beneficial / harmful?
Motivation

People often consult non-expert advice for financial decisions (Lusardi, 2003, 2008; van Rooij et al., 2011; Lusardi and Mitchell, 2014; Bernheim, 1998)

Social interaction affects personal financial decision making (Beshears et al., 2015; Brown et al., 2014; Bursztyn et al., 2014; Cai et al., 2015; Duflo and Saez, 2003; Hvide and Ostberg, 2014; Hong et al., 2004, 2005; Kast et al., 2016; Ivkovic and Weisbenner, 2007)

Are the effects beneficial / harmful?

Case of the blind leading the blind? (Bernheim, 1998)

- Even carefully designed, professional communication can fail to improve decision making, so why would the average peer to succeed? (Ambuehl, Bernheim, Lusardi, 2016)

“Two heads are better than one”?

- Often decision making better in groups (Charness and Sutter, 2012)
Research Questions

Does face-to-face communication with a randomly chosen peer improve or harm decision making quality? (as defined on next slide)
Research Questions

Does face-to-face communication with a randomly chosen peer improve or harm decision making quality? (as defined on next slide)

How and why?

1. Do subjects merely mimic other’s choices, or do they acquire skills they can apply to new problems?
   - Does financial education indirectly benefit others in the same way?

2. Between whom is communication most / least beneficial?

3. (How) do people re-evaluate their preferences?
Experimental choices

What amount £\( v^{\text{complex}} \) today is as good as receiving £5, invested at 1%, compounded daily, after 72 days?
Experimental choices

Each subject makes each choice twice, in two frames. Example:

- **Complex framing:*** What amount £v_{complex} today is as good as receiving £5, invested at 1%, compounded daily, after 72 days?

- **Simple framing:*** What amount £v_{simple} today is as good as receiving £10 in 72 days?

**Quality of decision making:** financial competence (Ambuehl, Bernheim, Lusardi, 2016)

⇒ Correct application of compound interest → \( v_{simple} = v_{complex} \)

⇒ The larger the distance, the worse the decision quality

**Virtues**

⇒ Non-paternalistic. Own preferences taken as benchmark.

⇒ Formal interpretation within behavioral welfare economics:

\[
| v_{simple} - v_{complex} | \text{ is maximal possible loss from deviation }
\]
Experimental choices

Each subject makes each choice twice, in two frames. Example:

▶ **Complex framing:** What amount £$v_{\text{complex}}$ today is as good as receiving £5, invested at 1%, compounded daily, after 72 days?

▶ **Simple framing:** What amount £$v_{\text{simple}}$ today is as good as receiving £10 in 72 days?

Quality of decision making: *financial competence* (Ambuehl, Bernheim, Lusardi, 2016)

▶ Correct application of compound interest $\rightarrow v_{\text{simple}} = v_{\text{complex}}$

▶ The larger the distance, the worse the decision quality
Experimental choices
Each subject makes each choice twice, in two frames. Example:

- **Complex framing:** What amount £\(v^{complex}\) today is as good as receiving £5, invested at 1%, compounded daily, after 72 days?

- **Simple framing:** What amount £\(v^{simple}\) today is as good as receiving £10 in 72 days?

Quality of decision making: *financial competence* (Ambuehl, Bernheim, Lusardi, 2016)

- Correct application of compound interest → \(v^{simple} = v^{complex}\)
- The larger the distance, the worse the decision quality

Virtues

- Non-paternalistic. Own preferences taken as benchmark.
- Formal interpretation within behavioral welfare economics: \(|v^{simple} - v^{complex}|\) is maximal possible loss from deviation
You will get the specified amount today | We will invest £5 in an account with 1% interest per day. Interest is compounded daily. We will pay you the proceeds in 72 days.

| £20 | □ | □ |
| £18 | □ | □ |
| £16 | □ | □ |
| :  | : | : |
| £2  | □ | □ |
| £0  | □ | □ |
Elicitation of $v^{\text{complex}}$

You will get the specified amount today

<table>
<thead>
<tr>
<th>Amount</th>
<th>Choice</th>
</tr>
</thead>
<tbody>
<tr>
<td>£20</td>
<td>□</td>
</tr>
<tr>
<td>£18</td>
<td>□</td>
</tr>
<tr>
<td>£16</td>
<td>□</td>
</tr>
<tr>
<td>:</td>
<td>:</td>
</tr>
<tr>
<td>£2</td>
<td>□</td>
</tr>
<tr>
<td>£0</td>
<td>□</td>
</tr>
</tbody>
</table>

We will invest £5 in an account with 1% interest per day. Interest is compounded daily. We will pay you the proceeds in 72 days.
### Elicitation of $\nu^{complex}$

You will get the specified amount today | We will invest £5 in an account with 1% interest per day. Interest is compounded daily. We will pay you the proceeds in 72 days.
---|---
£20 | £0
£18 | £0
£16 | £0
£2 | £0
£0 | £0
Elicitation of $v^{\text{complex}}$

<table>
<thead>
<tr>
<th>You will get the specified amount today</th>
<th>We will invest £5 in an account with 1% interest per day. Interest is compounded daily. We will pay you the proceeds in 72 days.</th>
</tr>
</thead>
<tbody>
<tr>
<td>£20</td>
<td>□</td>
</tr>
<tr>
<td>£18</td>
<td>□</td>
</tr>
<tr>
<td>£16</td>
<td>□</td>
</tr>
<tr>
<td>:</td>
<td>:</td>
</tr>
<tr>
<td>£2</td>
<td>□</td>
</tr>
<tr>
<td>£0</td>
<td>□</td>
</tr>
</tbody>
</table>
You will get the specified amount today

<table>
<thead>
<tr>
<th>Amount</th>
<th>Button</th>
<th>Proceeds in 72 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>£20</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>£18</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>£16</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>£2</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>£0</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

We will invest £5 in an account with 1% interest per day. Interest is compounded daily. We will pay you the proceeds in 72 days.
Elicitation of $v^{simple}$

You will get the specified amount today

<table>
<thead>
<tr>
<th>Amount</th>
<th>Finished</th>
<th>Specified</th>
</tr>
</thead>
<tbody>
<tr>
<td>£20</td>
<td>■</td>
<td></td>
</tr>
<tr>
<td>£18</td>
<td>■</td>
<td></td>
</tr>
<tr>
<td>£16</td>
<td>□</td>
<td>■</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>£2</td>
<td>□</td>
<td>■</td>
</tr>
<tr>
<td>£0</td>
<td>□</td>
<td>■</td>
</tr>
</tbody>
</table>

We will pay you £10 in 72 days.
Timeline

Stage 1

Stage 2

Choice Problems
Timeline

Stage 1

Stage 2

Choice Problems

Communication: Discussion
Timeline

Stage 1

Choice Problems

Stage 2

Communication:

Solitary: Contemplation

Discussion
Timeline

Stage 1
- Choice Problems
  - Discussed
  - Novel

Stage 2
- Choice Problems

Communication:
- Discussion

Solitary:
- Contemplation
Timeline

Stage 0
Choice Problems

Stage 1
Choice Problems
- Discussed
- Novel

Stage 2
Choice Problems

Communication:
Discussion

Solitary:
Contemplation
Timeline

Stage 0
Choice Problems

Communication:
Solitary:
Comm. with Educ.

Stage 1
Choice Problems
- Discussed
- Novel

Discussion

Stage 2
Choice Problems

Contemplation

Education for partners
Timeline

Stage 0
Choice Problems

Stage 1
Choice Problems

Stage 2
Choice Problems
- Discussed
- Novel

Communication: Discussion

Solitary: Contemplation

Comm. with Educ.
Education for partners

Documentary

Communication

Data

- 263 subjects
- University of Birmingham, UK, Fall 2015-Spring 2016
- Mean completion time 123.75 min, mean payment £26.55

Dependent Variable

- Financial competence $-|v^{\text{complex}} - v^{\text{simple}}|$ 
- Normalized as if each future value was £1
Does communication help or hurt decision making quality?

Averaged across discussed and novel tasks. Slopes: Solitary: 0.016 (s.e. 0.018). Communication: 0.088*** (s.e. 0.017). Diff-in-diff: 0.072*** (s.e. 0.027). OLS, s.e. clustered by subject.
Does communication help or hurt decision making quality?

![Graph showing the impact of communication on financial competence across different stages.](image)

Averaged across discussed and novel tasks. Slopes: Solitary: 0.016 (s.e. 0.018). Communication: 0.088*** (s.e. 0.017). Diff-in-diff: 0.072*** (s.e. 0.027). OLS, s.e. clustered by subject.
Research Questions

Does face-to-face communication with a randomly chosen peer improve or harm decision making quality? (as defined on next slide)

How and why?

1. Do subjects merely mimic other’s choices, or do they acquire skills they can apply to new problems?
   - Does financial education indirectly benefit others in the same way?

2. Between whom is communication most / least beneficial?

3. (How) do people re-evaluate their preferences?
Research Questions

Does face-to-face communication with a randomly chosen peer improve or harm decision making quality?
Communication improves decision making

How and why?
1. Do subjects merely mimic other’s choices, or do they acquire skills they can apply to new problems?
   - Does financial education indirectly benefit others in the same way?
2. Between whom is communication most / least beneficial?
3. (How) do people re-evaluate their preferences?
Research Questions

Does face-to-face communication with a randomly chosen peer improve or harm decision making quality?

Communication improves decision making

How and why?

1. Do subjects merely mimic other’s choices, or do they acquire skills they can apply to new problems?
   - Does financial education indirectly benefit others in the same way?

2. Between whom is communication most / least beneficial?

3. (How) do people re-evaluate their preferences?
Conceptual learning or choice mimicry?

**Slopes:** solitary-discussed: 0.022 (s.e. 0.022), solitary-novel: 0.009 (s.e. 0.022), communication-discussed: 0.096*** (s.e. 0.019), communication-novel 0.081*** (s.e. 0.018). **Diff-in-diff:** discussed: 0.073** (s.e. 0.030), novel 0.071** (s.e. 0.029). OLS, s.e. clustered by subject.
Conceptual learning or choice mimicry?

**Discuss**

\[
\text{Stage 1} \quad \text{Stage 2}
\]

**Novel**

\[
\text{Stage 1} \quad \text{Stage 2}
\]

Slopes: solitary-discussed: 0.022 (s.e. 0.022), solitary-novel: 0.009 (s.e. 0.022),
communication-discussed: 0.096*** (s.e. 0.019), communication-novel 0.081*** (s.e.
0.018). *Diff-in-diff:* discussed: 0.073** (s.e. 0.030), novel 0.071** (s.e. 0.029). OLS,
s.e. clustered by subject.
Conceptual learning or choice mimicry?

![Graphs showing financial competence across stages](image)

**Slopes:** solitary-discussed: 0.022 (s.e. 0.022), solitary-novel: 0.009 (s.e. 0.022), communication-discussed: 0.096*** (s.e. 0.019), communication-novel 0.081*** (s.e. 0.018). **Diff-in-diff:** discussed: 0.073** (s.e. 0.030), novel 0.071** (s.e. 0.029). OLS, s.e. clustered by subject.
Research Questions

Does face-to-face communication with a randomly chosen peer improve or harm decision making quality?

Communication improves decision making

How and why?

1. Do subjects merely mimic other’s choices, or do they acquire skills they can apply to new problems?
   - Does financial education indirectly benefit others in the same way?

2. Between whom is communication most / least beneficial?

3. (How) do people re-evaluate their preferences?
Research Questions

Does face-to-face communication with a randomly chosen peer improve or harm decision making quality?

Communication improves decision making

How and why?

1. Do subjects merely mimic other’s choices, or do they acquire skills they can apply to new problems? Can generalize
   - Does financial education indirectly benefit others in the same way?

2. Between whom is communication most / least beneficial?

3. (How) do people re-evaluate their preferences?
Research Questions

Does face-to-face communication with a randomly chosen peer improve or harm decision making quality?

Communication improves decision making

How and why?

1. Do subjects merely mimic other’s choices, or do they acquire skills they can apply to new problems? Can generalize
   - Does financial education indirectly benefit others in the same way?
2. Between whom is communication most / least beneficial?
3. (How) do people re-evaluate their preferences?
Indirect Effect of Education?

Slopes: Diff-in-diff communication with educated / not educated: 0.042, \( p = 0.016 \).

Discussion in % of pairs

<table>
<thead>
<tr>
<th>Communication</th>
<th>Comm. with Educ.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rule of 72</td>
<td>2%</td>
</tr>
<tr>
<td>Compound interest formula</td>
<td>63%</td>
</tr>
</tbody>
</table>
Indirect Effect of Education?

Discussion in % of pairs

<table>
<thead>
<tr>
<th>Communication</th>
<th>Comm. with Educ.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rule of 72</td>
<td>2%</td>
</tr>
<tr>
<td>Compound interest formula</td>
<td>63%</td>
</tr>
</tbody>
</table>

Slopes: Diff-in-diff communication with educated / not educated: $0.042, p = 0.016$. 
Indirect Effect of Education?

**Slopes:** Diff-in-diff communication with educated / not educated: 0.042, $p = 0.016$.

<table>
<thead>
<tr>
<th>Discussion in % of pairs</th>
<th>Communication</th>
<th>Com. with Educ.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rule of 72</td>
<td>2%</td>
<td>73.2%</td>
</tr>
<tr>
<td>Compound interest formula</td>
<td>63%</td>
<td>42%</td>
</tr>
</tbody>
</table>
Research Questions

Does face-to-face communication with a randomly chosen peer improve or harm decision making quality?

Communication improves decision making

How and why?

1. Do subjects merely mimic other’s choices, or do they acquire skills they can apply to new problems? Can generalize
   - Does financial education indirectly benefit others in the same way?

2. Between whom is communication most / least beneficial?

3. (How) do people re-evaluate their preferences?
Research Questions

Does face-to-face communication with a randomly chosen peer improve or harm decision making quality?
Communication improves decision making

How and why?
1. Do subjects merely mimic other’s choices, or do they acquire skills they can apply to new problems? Can generalize
   - Does financial education indirectly benefit others in the same way? Education indirectly helps through mimicking, but not improved understanding.
2. Between whom is communication most / least beneficial?
3. (How) do people re-evaluate their preferences?
Research Questions

Does face-to-face communication with a randomly chosen peer improve or harm decision making quality?

Communication improves decision making

How and why?

1. Do subjects merely mimic other’s choices, or do they acquire skills they can apply to new problems? Can generalize
   - Does financial education indirectly benefit others in the same way? Education indirectly helps through mimicking, but not improved understanding.

2. Between whom is communication most / least beneficial?

3. (How) do people re-evaluate their preferences?
Who benefits most from communication?

Hypothesis 1
Information flows from those who have it to those who do not (e.g. Jackson, Bruegman (2009) with elementary school teachers)
  ▶ Improve more the better the partner

Hypothesis 2
Skill transmission more effective between people of similar skills who can address concerns at appropriate level and pace (e.g. Booij, et al. 2016 and Feld, Zolitz, 2016 with univ. students)
  ▶ Improve more if partner more similar

4 kinds of pairs
Classify using stage 0 decisions (to avoid regression to the mean)
  ▶ Self in better / worse half
  ▶ Partner in better / worse half
**Difference in slope Communication to Solitary:** Self worse, partner worse: 16.4%*** (s.e. 2.2), Self worse, partner better: 8.29%*** (s.e. 2.13), Self better, partner worse: 0.48% (s.e. 2.47), Self better, partner better: -2.15% (s.e. 2.5). **Difference in better vs. worse partner:** Self worse: -8.06%*** (s.e. 2.18), Self better: -2.6% (s.e. 2.12). OLS, s.e. clustered by subject.
Difference in slope Communication to Solitary: Self worse, partner worse: 16.4%*** (s.e. 2.2), Self worse, partner better: 8.29%*** (s.e. 2.13), Self better, partner worse: 0.48% (s.e. 2.47), Self better, partner better: -2.15% (s.e. 2.5). Difference in better vs. worse partner: Self worse: -8.06%*** (s.e. 2.18), Self better: -2.6% (s.e. 2.12). OLS, s.e. clustered by subject.
Difference in slope Communication to Solitary: Self worse, partner worse: 16.4%*** (s.e. 2.2), Self worse, partner better: 8.29%*** (s.e. 2.13), Self better, partner worse: 0.48% (s.e. 2.47), Self better, partner better: -2.15% (s.e. 2.5). Difference in better vs. worse partner: Self worse: -8.06%*** (s.e. 2.18), Self better: -2.6% (s.e. 2.12). OLS, s.e. clustered by subject.
What do people discuss?

<table>
<thead>
<tr>
<th>Similarity</th>
<th>Highlight similarity</th>
<th>Minutes discussed</th>
<th># small talk topics (of 3)</th>
<th># problems (of 6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(TT/BB)</td>
<td>80% (8%)</td>
<td>10.1 (0.8)</td>
<td>0.4 (0.1)</td>
<td>4.07 (0.29)</td>
</tr>
<tr>
<td>(TB/BT)</td>
<td>39.5% (8%)</td>
<td>8.3 (0.8)</td>
<td>0.66 (0.1)</td>
<td>4.17 (0.28)</td>
</tr>
</tbody>
</table>

Variables

- Highlight similarities e.g. “I’m bad at this too, let’s see whether we can help each other out”
- Small talk topics: Country of origin, college major, years of study
Does face-to-face communication with a randomly chosen peer improve or harm decision making quality?

Communication improves decision making

How and why?

1. Do subjects merely mimic other’s choices, or do they acquire skills they can apply to new problems? Can generalize
   - Does financial education indirectly benefit others in the same way? Education indirectly helps through mimicking, but not improved understanding.

2. Between whom is communication most / least beneficial?
   - Between people with similar skill levels, as transmission requires ‘common language’

3. (How) do people re-evaluate their preferences?
Research Questions

Does face-to-face communication with a randomly chosen peer improve or harm decision making quality?

Communication improves decision making

How and why?

1. Do subjects merely mimic other’s choices, or do they acquire skills they can apply to new problems? Can generalize
   - Does financial education indirectly benefit others in the same way? Education indirectly helps through mimicking, but not improved understanding.

2. Between whom is communication most / least beneficial?
   Between people with similar skill levels, as transmission requires ‘common language’

3. (How) do people re-evaluate their preferences?
Does communication cause assimilation of discount rates?

- Estimate

\[ \delta_{2}^{self} = \alpha + \beta \delta_{1}^{other} + (1 - \beta)\delta_{1}^{self} + \epsilon \]

- Attenuation bias: Instrument \((\delta_{1}^{self}, \delta_{1}^{other})\) with \((\delta_{0}^{self}, \delta_{0}^{other})\)
Does communication cause assimilation of discount rates?

- Estimate

\[ \delta_{2}^{\text{self}} = \alpha + \beta \delta_{1}^{\text{other}} + (1 - \beta) \delta_{1}^{\text{self}} + \epsilon \]

- Attenuation bias: Instrument \((\delta_{1}^{\text{self}}, \delta_{1}^{\text{other}})\) with \((\delta_{0}^{\text{self}}, \delta_{0}^{\text{other}})\)

Assimilation towards partner, \(\beta\)
Does communication cause assimilation of discount rates?

- **Estimate**
  \[
  \delta_2^{self} = \alpha + \beta \delta_1^{other} + (1 - \beta) \delta_1^{self} + \epsilon
  \]

- **Attenuation bias:** Instrument \((\delta_1^{self}, \delta_1^{other})\) with \((\delta_0^{self}, \delta_0^{other})\)

**Assimilation towards partner, \(\beta\)**

![Bar chart showing assimilation towards partner, \(\beta\), for different groups: All, Partner patient half, Partner impatient half.](image-url)
Research Questions

Does face-to-face communication with a randomly chosen peer improve or harm decision making quality?

Communication improves decision making

How and why?

1. Do subjects merely mimic other’s choices, or do they acquire skills they can apply to new problems? Can generalize
   - Does financial education indirectly benefit others in the same way? Education indirectly helps through mimicking, but not improved understanding.

2. Between whom is communication most / least beneficial?
   Between people with similar skill levels, as transmission requires ‘common language’

3. (How) do people re-evaluate their preferences?
Research Questions

Does face-to-face communication with a randomly chosen peer improve or harm decision making quality?

Communication improves decision making

How and why?

1. Do subjects merely mimic other’s choices, or do they acquire skills they can apply to new problems? Can generalize
   - Does financial education indirectly benefit others in the same way? Education indirectly helps through mimicking, but not improved understanding.

2. Between whom is communication most / least beneficial?
   Between people with similar skill levels, as transmission requires ‘common language’

3. (How) do people re-evaluate their preferences?
   Subjects assimilate to peer. More so if peer more patient.
Policy implications

Financial decision making may be improved by encouraging communication

- Will be most effective if (e.g. in financial education interventions) people of similar skill level are paired
  - Related results in field experiments by Booij et al., 2016, and Feld & Zolitz, 2016
- By contrast, educating part of population and relying on diffusion may be ineffective

Further questions

- Role of confidence?
  - Our experiment: Ability and confidence highly correlated
  - Maybe less so in other contexts (e.g. Linnainmaa et al., 2016)
- Would effects be similar in less / more educated subject pools?