Bubbling with Excitement: An Experiment

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Red Hat Software

• Mar 1998 36 employees
• Aug 1999 IPO open @ $14 close @ $52
• Aug 1999 growing revenue, negative earnings
• Dec 10, 1999
  – 333 employees
  – $286 stock price
  – $19.7 billion market cap (~$60 million per employee)
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Investor Decision Making

• Preferences
  – Prospect theory

• Beliefs
  – Overconfidence—trade too much
  – Representativeness heuristic
    • Availability bias—IPOs
    • Recency bias—chase performance

• Limited attention
  – Buying behavior of individuals

• Emotions
  – Regret
    • Disposition effect, repurchases of stocks previously sold
Bubbles in Experimental Markets: Experimental Environment

• The basic experimental setup has the following features
  – 15 period asset
  – Dividend uncertainty
    • \{0, 8, 28, 60\}
  – Initial cash and shares
  – Double auction or call market trading mechanism
Current round: 2
Time Remaining: 0:20

Orders
Submit New Order: buy [ ] sell [ ]
Immediate Order: buy [600] sell [320]

Your Holdings
Cash: 1084
Shares: 3

Information
Alert:

This is Round 2. At the end of each round, a share will pay the owner a dividend of either 0, 8, 28, or 60 cents, with equal chances.

The average dividend value for the remaining rounds is 14*24=336 cents per share.
Fundamental Value Line

Price in Cents

Period

Courtesy of David Porter
Related Research

• Smith, Suchanek, and Williams (Econometrica 1988) establish bubbles in experimental markets

• Caginalp, Porter, and Smith (Journal of Behavioral Finance, 2001) explore conditions leading to larger bubbles
  • Higher initial cash to share ratio (greater liquidity)
  • Dividend paid immediately (greater liquidity)
  • Closed order book

• Dufwenberg, Lindqvist, & Moore (AER 2005)
  – If even 1/3 of participants have had experience in the same experimental market setting, bubble are greatly diminished

• Greater bubbles with lottery like dividends (Ackert, Charupat, Church, and Deaves, 2006)

• Hussam, Porter, Smith (AER 2008)
  – A large shock to liquidity and increased lottery-like dividend “rekindle” bubbles with experience participants

• Lei, Noussair, & Plott (Econometrica 2001)
  – Bubbles even without possibility of speculation
    • Designated buyers & sellers
    – Active participation hypothesis
Related Research

- Bubbles with certain dividends (Porter & Smith, 1995)
- Markets with short selling
  - bubbles occur (King, Smith, Williams, and Van Boening, 1993),
  - bubbles diminished or eliminated (Haruvy and Noussair, 2004; Ackert, Charupat, Church, and Deaves, 2006)
- Greater bubbles when margin allowed (Ackert, Charupat, Church, & Deaves, 2006)
- Bubbles with non-undergraduate participants (e.g., Arizona executives)
- Do participants understand declining fundamental value? Kirchler, Huber, and Stöckl (2010)
- Bubbles with constant fundamental value Noussair and Ruffieux (2001)
- Greater bubbles with positive mood than neutral mood Lahav and Meer (2010)
  - 4 market simulations; 2 conditions
Emotions and Experiments

• Positive affect:
  – changes information processing by exacerbating decision biases and reliance on heuristics (Bless, Bohner, Schwarz, and Stack, 1990; Schwarz, 1990; Ruder and Bless, 2003)
  – impacts preferences by making people misattribute the incidental pleasantness and/or arousal to liking for the target event (Andrade and Ariely 2009; Pham 1998)
  – influences beliefs by making people form more optimistic assessments of everyday risks (Hogarth et al 2011; Johnson and Tversky 2003)

• Negative affect (fear) : can decrease risk-taking (Guiso, Sapienza, and Zingales, 2011)
  – When the national soccer team loses a World Cup match, the national stock market falls the next day. Edmans, Garcia, Norli (2006)
Videos

**Experiment 1:**
- Exciting/Positive
  - Scenes from action film
  - Unexciting/Neutral
  - Scenes from historical documentary

**Experiment 2:**
- Exciting/Positive
  - Scenes from action film
  - Exciting/Fear
  - Scenes from horror film

**Experiment 3:**
- Exciting (“Knight & Day” or “Mr. and Mrs. Smith”)
- Sad (scenes from “I am Sam” or “The Champ”)
Videos

“Because the waiting is a bit long, we will play a video clip. Since we intend to use videos clips in another experiment, we've selected a few different video clips. You will be randomly assigned to one of them. After you've finished watching the clip, please answer a few questions about it. Note that the video is not related to your earnings today. So thank you in advance for helping out.”

QUESTION USED IN STUDY 2
1. Please indicate (a) the emotional state that BEST describes what you've experienced while watching the video clip--only one option allowed. Then, indicate the intensity of the selected emotional experience.

   ___Anxiety/Fear/Nervousness ___
   (1=very little;9=very much)

   ___Excitement/Pleasure/Enthusiasm ___ (1=very little;9=very much)
Exciting Video

Neutral Video
Exciting Video

Fear Video
Metrics:

\[ \text{Magnitude} = \frac{1}{15} \sum_{r=1}^{15} (\bar{P}_r - f_r) \]

\[ \text{Amplitude} = \max_{r \in (1, 15)} (\bar{P}_r - f_r) \]

where \( \bar{P}_r \) is the average transaction price in round \( r \) and \( f_r \) is the fundamental value in round \( r \) (i.e., the expected of remaining dividends).

Tests:

Two-sample t test with equal variances
Two-sample Wilcoxon rank-sum (Mann-Whitney) test
## Results

**Panel A: Average Magnitude across Markets**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>N</th>
<th>Mean</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excitement</td>
<td>24</td>
<td>285.4</td>
<td>17.3</td>
</tr>
<tr>
<td>Neutral</td>
<td>8</td>
<td>166.1</td>
<td>19.9</td>
</tr>
<tr>
<td>Fear</td>
<td>8</td>
<td>186.0</td>
<td>18.0</td>
</tr>
<tr>
<td>Sadness</td>
<td>8</td>
<td>197.8</td>
<td>26.0</td>
</tr>
</tbody>
</table>

**Panel B: Average Amplitude across Markets**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>N</th>
<th>Mean</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excitement</td>
<td>24</td>
<td>512.3</td>
<td>30.2</td>
</tr>
<tr>
<td>Neutral</td>
<td>8</td>
<td>314.7</td>
<td>43.9</td>
</tr>
<tr>
<td>Fear</td>
<td>8</td>
<td>382.0</td>
<td>30.1</td>
</tr>
<tr>
<td>Sadness</td>
<td>8</td>
<td>357.1</td>
<td>34.5</td>
</tr>
</tbody>
</table>
• Null: magnitude(exciting) = magnitude(neutral)
  – t test: t = 3.7, p < 0.001
  – rank sum test: z = 3.15, p < 0.002

• Null: amplitude(exciting) = amplitude(neutral)
  – t test: t = 3.39, p < 0.01
  – rank sum test: z = 3.16, p < 0.01

• Null: magnitude(exciting) = magnitude(fear)
  – t test: t = 3.11, p < 0.01
  – rank sum test: z = 2.87, p < 0.01

• Null: amplitude(exciting) = amplitude(fear)
  – t test: t = 2.34, p < 0.02
  – rank sum test: z = 2.35, p < 0.02

• Null: magnitude(exciting) = magnitude(sad)
  – t test: t = 2.61, p < 0.01
  – rank sum test: z = 2.50, p < 0.02

• Null: amplitude(exciting) = amplitude(sad)
  – t test: t = 2.76, p < 0.01
  – rank sum test: z = 3.03, p < 0.01
Mechanism(s)

• Does positive/excited mood make participation in market more fun?
• Does positive/excited mood increase overconfidence?
• Does positive/excited mood increase reliance on heuristics and extrapolation of past returns?
Conclusion

• Positive, high arousal affect leads to greater bubbles

• Potential feedback loop in affect and returns.