Popular accounts of financial bubbles often focus on emotions, on “the hysteria to buy in
the first place, which inflates the bubble so greatly, and the panic selling which bursts the
bubble” (Sheeran and Spain, 2004) on madness (Mackay, 2003), on mania (Goldgar,
2007), and on exhuberance (Shiller, 2000). Experimental studies of asset pricing bubbles
have examined a number of factors contributing to likelihood and magnitude of bubbles
including liquidity, experience, transparency, novelty of environment, and speculation
(Caginalp, Porter, and Smith, 2001; Dufwenber, Lindqvist, and Moore, 2005, Hussam,
Reshmaan N., David Porter, and Vernon L. Smith, 2008; Lei, Noussair, and Plott, 2001).
We study the role played by emotions.

Previous studies have established a link between events thought to affect the emotional
state of investors and stock returns. For example, Edmans, et al. (2007) document
significant market declines subsequent to losses by national soccer teams. And Saunders
(1993) and Hirshleifer and Shumway (2003) find that stock returns are higher on sunny
days. Although the importance of such field studies is indisputable, we believe there is
also room for research enterprises that focus on direct causal evidence and theoretical
testing. Moreover, given that actual online stock trading often involves inexperienced
investors making decisions in front of a computer, simulating online trading with naïve
participants in a behavioral lab does not represent a completely unrealistic setting.

Experimental asset market is suitable means to study how our emotions causally
influence financial behavior at the individual and market levels. Experimental studies of
asset pricing bubbles have examined a number of factors contributing to likelihood and
magnitude of bubbles including liquidity, experience, transparency, novelty of
environment, and speculation (Caginalp, Porter, and Smith, 2001; Dufwenber, Lindqvist,
and Moore, 2005, Hussam, Reshmaan N., David Porter, and Vernon L. Smith, 2008; Lei,
Noussair, and Plott, 2001). We study the role played by emotions.

Our experimental market is modeled on those of Smith, Suchanek, and Williams (1988)
and Caginalp, Porter, and Smith (2001). Subjects participate in a laboratory market where
they can trade a risky asset over a computer network. Each experimental session consists
of fifteen rounds of trading. The risky asset pays a random dividend after each round and
expires worthless after the fifteenth dividend is paid. The distribution and expected value
of future dividends are known to all subjects. Thus the risky asset has a clear fundamental
value that is known to all subjects. Here is a link to the written experimental instructions:
http://esi2.chapman.edu/sandler/emotion/page1.html

After a practice round of trading, participants are exposed to an emotion-inducing task.
Precisely, subjects are told, “The practice is over. If you have any question, please raise
your hand now. We are going to start the actual experiment shortly. We will now have to
get the software ready and this may take around 5 to 8 minutes. While you are waiting,
we ask you as a favor to help rate a short piece of video that we intend to use in future experiments. We will play a video on your computer. Please answer a few questions at the end of it." The subjects then watch either an exciting upbeat video or a video of similar length but with neutral content. Video clips have consistently shown to temporally change one’s current emotional states and to affect decision making in unrelated economic tasks (Lerner, Small and Loewenstein 2004; Andrade and Ho 2007; Andrade and Ariely 2009). After watching the video, subjects are asked to report how they feel on a nine-point scale ranging from “Very Calm/Relaxed” (1) to “Very Active/Excited” (9). The average rating of the exciting video is 6.3 and of the neutral video 3.4.

For each of the two treatments—exciting and neutral, we have run eight experimental sessions. Nine traders participate in each session. Three traders receive an initial endowment of $18 plus 1 share of the risky asset; three traders receive $14.4 plus 2 shares; three traders receive $10.80 plus 3 shares. The dividends are 0¢, 8¢, 28¢, and 60¢ with equal probability and are paid at the end of each trading period. Participants receive the cash value of their account at the end of round 15 plus a $5 payment for showing up at the experiment.

The experimental sessions are run in pairs (i.e., one neutral and one excitement treatment). In total 16 experimental sessions have been conducted (8 neutral and 8 excitement treatments). Outcomes for each of the experimental sessions are plotted in Figure 1. For each session, the prices of trades as well as the fundamental values each period are shown. It is visually obvious that prices tend to more greatly deviate from fundamental values for sessions in the exciting treatment. Figure 2 presents the average deviations from fundamentals per experimental treatment.

To measure the magnitude of bubbles, we first calculate the average trade price for each period. We then subtract each period’s fundamental value from its average trade price to get each period’s excess price. We average these across periods to get each session’s average excess price. We test the null hypothesis that the average excess price is the same for both treatments. Table 1 reports the results from a t test for the difference in the mean average excess price for each treatment. The null hypothesis is rejected (p < 0.01). Table 2 reports the results from a non-parametric two-sample Wilcoxon rank sum test. Again, the null hypothesis is rejected (p < 0.01).

Our results and tests provide strong evidence supporting our contention that the emotional state of participants affects the magnitude of bubbles in experimental markets. However, there are competing explanations for our results. The videos we have shown participants differ on two emotional dimensions, valence and intensity. The exciting video we used has positive valence and high intensity; the neutral video we used has neutral valence and low intensity. The participants in the exciting treatment could be responding to either positive valence or high intensity or a combination of both. Further, the exciting video is comprised mostly of uncertain and risky content (inherent to any exciting experience), which could be priming participants for risk taking behavior, which is not present in the current control condition.
Therefore, it is possible that priming or arousal per se generated the observed effects. To address this possibility, we plan to run 8 extra pairs (16 sessions) in which participants will be shown (1) a video with primed risk and uncertainty, high intensity but negative valence—scenes from a horror movie, (2) a second exciting, positive valence video.

To test whether, along with positive valence, high arousal is required to produce the observed effects, two other treatments (16 sessions) will be included (3) a positive valence, but low intensity video (e.g., sitcom), and (4) a negative valence, but low intensity video (e.g., light drama).

In addition, if budget allows, we will run a robustness check with videos from online brokerage commercials. We would plan to run a final set of eight experimental sessions in which we show subjects a compilation of actual online brokerage television commercials with positive valence.
Figure 1. Vertical axis is price. Blue dots represent trades. Grey bars give the fundamental value for each of the fifteen trading periods.
Figure 2. Average outcome per treatment. Vertical axis is price. Blue dots represent trades. Grey bars give the fundamental value for each of the fifteen trading periods.
Table 1. Two-sample t test for difference in means by treatment group for the mean of each period’s average excess price—average trade price minus fundamental value; Group 0 is the neutral treatment; group 1 the exciting treatment.

<table>
<thead>
<tr>
<th>Group</th>
<th>Obs</th>
<th>Mean</th>
<th>Std. Err.</th>
<th>Std. Dev.</th>
<th>[95% Conf. Interval]</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>8</td>
<td>153.3064</td>
<td>13.5479</td>
<td>38.31924</td>
<td>121.2707 185.342</td>
</tr>
<tr>
<td>1</td>
<td>8</td>
<td>284.6367</td>
<td>34.31932</td>
<td>97.06969</td>
<td>203.4844 365.789</td>
</tr>
<tr>
<td>combined</td>
<td>16</td>
<td>218.9715</td>
<td>24.59902</td>
<td>98.39607</td>
<td>166.5399 271.4031</td>
</tr>
</tbody>
</table>

| diff | -131.3303 | 36.89663 | -210.4657 | -52.1949 |

**diff = mean(0) - mean(1) t = -3.5594**

- **Ho: diff = 0**
- **Ha: diff < 0**
- **Ha: diff ≠ 0**
- **Ha: diff > 0**

Pr(T < t) = 0.0016  Pr(|T| > |t|) = 0.0031  Pr(T > t) = 0.9984

Table 2. Two-sample Wilcoxon rank-sum (Mann-Whitney) test by treatment group for the mean of each period’s average excess price—average trade price minus fundamental value; Group 0 is the neutral treatment; group 1 the exciting treatment.

<table>
<thead>
<tr>
<th>treatment</th>
<th>obs</th>
<th>rank sum</th>
<th>expected</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>8</td>
<td>42</td>
<td>68</td>
</tr>
<tr>
<td>1</td>
<td>8</td>
<td>94</td>
<td>68</td>
</tr>
<tr>
<td>combined</td>
<td>16</td>
<td>136</td>
<td>136</td>
</tr>
</tbody>
</table>

**Ho: mean(treatment==0) = mean(treatment==1)**

z = -2.731  Prob>|z| = 0.0063

References


Dichev, Ilia D. and Janes Troy D, 2001, Lunar cycle effects in stock returns, working paper, University of Michigan


