**Pricing Information: Experimental Evidence**

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**Research Questions**
Information plays a crucial role in decision making. However, information is often imprecise, and so it might be difficult to evaluate the value of information.

For example, how much one should pay for an earnings forecast of an equity analyst?

This project addresses two questions:
1. How accurately do people price (imprecise) information?
2. Which factors mostly affect the process of pricing information?

**Theory**
Is signal S worth buying? Compare:

\[
\max_{\alpha} \{\mathbb{E}[u(x(\alpha))]\} \quad \text{vs} \quad \max_{\alpha} \{\mathbb{E}[u(x(\alpha) - \pi)|S]\}
\]

- \(\alpha\): decision, \(x(\alpha)\): payoff, \(\pi\): price for signal \(S\)

**Stages of Evaluation:**
1. Estimate the expected gain without the signal \(S\)
2. Estimate the informativeness of the signal \(S\)
3. Estimate the expected gain with the signal \(S\)
4. Make the decision that maximizes expected utility

**Result 1: Performance**

<table>
<thead>
<tr>
<th></th>
<th>Bench. Buy</th>
<th>Bench. Ignore</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part. Buy</td>
<td>-0.24</td>
<td>-2.47</td>
</tr>
<tr>
<td>Part. Ignore</td>
<td>-1.10</td>
<td>-0.56</td>
</tr>
</tbody>
</table>

**Table 1: Decomposition of losses**
Each cell shows the average difference in payoffs of the participant and the benchmark
Benchmark earned on average 3.7 (4.8) points per prediction without (with) the signals

**Result 2: Pricing**

- Participants lost on average 0.56 points per prediction (15%) on deviations from \(F_t\)
- On average 0.24 points (5%) was lost on incorrect weighting of the signals
- 0.54 (=-1.10+0.56) points (11%) was lost when ignoring undervalued signals
- 2.23 (=2.47+0.24) points (60%) was lost when buying overvalued signals

**Result 3: Dynamics**
We explored the deviations from the optimal strategy:

\[
Prediction_t - OS_t = \alpha + \beta_1(F_{t-1} - F_{t-2}) + \beta_2(F_{t-2} - F_{t-3}) + \beta_3(F_{t-3} - F_{t-4}) + \epsilon_t
\]

where

\[
OS_t = \begin{cases} 
F_{t-1}, & \text{no signal} \\
F_{t-1} + \sqrt{q}(S_t - F_{t-1}), & \text{with signal}
\end{cases}
\]

Results for predictions with and without the signal:

<table>
<thead>
<tr>
<th></th>
<th>(\alpha)</th>
<th>(\beta_1)</th>
<th>(\beta_2)</th>
<th>(\beta_3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No signal</td>
<td>0.943***</td>
<td>0.063***</td>
<td>-0.066***</td>
<td>-0.068***</td>
</tr>
<tr>
<td>With signal</td>
<td>0.399***</td>
<td>0.005</td>
<td>-0.001</td>
<td>-0.009</td>
</tr>
</tbody>
</table>

- Predictions without signals reveal optimism (\(\alpha > 0\)), "short-term" momentum (\(\beta_1 > 0\)), and "long-term" reversal (\(\beta_2 < 0, \beta_3 < 0\))
- Predictions with signals show a noticeable reduction in these biases
- More biased participants do not price signals higher than their less biased peers

**Setting of the Experiment**
Participants forecast a Random Walk (RW) process:

\[
F_{t+1} = F_t + \epsilon_{t+1}
\]

Participants can buy a signal at each step:

\[
S_{t+1} = F_t + \eta_{t+1}
\]

where \(\eta_{t+1} = \sqrt{q}\epsilon_{t+1} + \sqrt{1-q}z_{t+1}, \epsilon_{t+1} \perp z_{t+1}, q \in [0,1]\) controls informativeness of the signal.

Participants observe the signal’s price and 20 past observations of the RW process and the signal. They should decide whether to make their forecast with or without the signal.

**Sample**
139 students from Higher School of Economics (Moscow) participated in the study.
- Background in Economics or Finance
- Had a Probability theory course

**Next Steps**
We recently ran a modified experiment on a sample of investors on Prolific. We are currently analyzing the collected data.

**Contact Information**
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