

# Poster: The Role of Confirmation Bias in Potentially Undermining Speculative Cryptocurrency Decisions

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## I. INTRODUCTION

Studies have demonstrated that news reporting (as information) is critical to the adoption and pricing of Bitcoin. This early stage work represents the first look into how this information is being used as part of the speculation decision making process and how this might be compatible with a trust model. The outputs of this work will build a trust model for Bitcoin speculators' use of news reporting as an information source. The work will further demonstrate if, and how, this trust model might be usurped by something as simple as a confirmation bias thus confirming a more psychological approach to speculative behaviours than that portrayed in a rational economics approach.

## II. RESEARCH QUESTIONS

Prior works [1] clearly link both social chatter and news reporting in a feedback loop influencing the adoption of Bitcoin. However, no work currently looks to why news reporting seemingly plays such a pivotal role in Bitcoin speculative behaviours. This work aims to answer the following research questions:

*RQ1*- Do investors in Bitcoin actually pay attention to news reporting when making speculation decisions?

*RQ2*- Does this attention constitute a trust in information?

*RQ3*- Where news reporting is being relied upon; is it possible that Bitcoin speculation might be driven more by a simple confirmation bias than by trust in the information itself? (i.e. confirmation bias in the evaluation of news reporting as an information source might actually be presenting a barrier to investors moving from trusting in the source of the news to a true and rational trust in the fundamentals of the story itself.)

## III. BACKGROUND

In 2013 alone the price of a single Bitcoin leapt from just over USD\$13 in January to an all time high of over USD\$1,147 by December before crashing back to USD\$360 by April 2014. Existing works [2], [3], [4] have looked at the role of

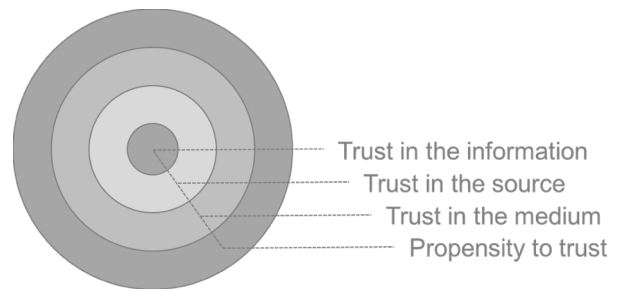


Fig. 1. Lucassen's Model of Information Judgment

economic fundamentals (supply and demand) in Bitcoin speculation.

### A. Information in Decision Making

The importance of information in supporting investment decisions is well understood [1],[5], [6], [7] and today the sheer breadth and volume of information and news available presents a challenge to anyone looking to understand the risk inherent in speculating in Bitcoin. The range of information sources available spans not only the partisan purveyors and naysayers but also the middle-ground. It also includes chatter on social networks through to news reporting and on to research and statements from multi-national banking corporations and authoritative bodies.

Whilst (a possibly outdated) economics perspective suggests that investors are rational [8], the psychological perspective leans more to notions of bias being critical in how people evaluate information.

### B. Information Trust Model Based Decision Making

Works by Lucassen [9], admittedly limited in scope, have sought to explain just how people evaluate information through a layered model of trust; where each layer takes account of a specific bias influencing the next (Fig. 1.) with the centre of the model being a trust in the information itself. Someone who exhibits a trust in information (i.e. the centre-most layer in Fig. 1) is able to provide rational understanding of the fundamentals within the information free from bias.

However, contemporary works looking at stock investments and information valuation [5] have clearly demonstrated that, where social chatter is observed by investors, there is strong evidence to support confirmation bias as undermining their capability to make rational (trust in information ala Lucassen) decisions. Rather the investors had a tendency to “*treating messages that support their prior beliefs*” preferentially. This tendency was found to be more pronounced in those with higher levels of self perceived expertise and stronger prior held beliefs towards particular stocks, resulting in an over-confidence in decision making.

#### IV. METHODOLOGICAL APPROACH

To gain insight into these research questions we have developed an online survey of Bitcoin users, due for publication in late January 2016 with results being expected for analysis by early March 2016. The survey questions Bitcoin users as to: (i) their use of the cryptocurrency, general sentiment towards Bitcoin and its long-term prospects; (ii) self perceived levels of knowledge and expertise; and (iii) a general set of questions around technology and news consumption. We address the research questions thusly:

*RQ1* – We ask participants which types of information sources they use when making speculative decisions and then to express their own trust in the credibility of those types of source. News websites are one of the potential options as are social networks and personal contacts. From this we should be able to observe relative levels of trust in differing information sources.

*RQ2* - Following rationale set out for determining influential Bitcoin news websites [10] we have built a corpus of 3,270 news stories for the period April 2013 – March 2014 across eight separate websites. From this corpus, participants are presented with a news story evaluation task - analogous with that in Lucassen’s “Factual Accuracy and Trust in Information” within [9] – and asked to rate the credibility of six news stories where half are manually edited to contain factual anomalies (i.e., they are of low quality). The hypothesis underpinning this task is that participants whose model of trust reaches the information layer should reliably rate those stories that are of the highest quality most credible.

*RQ3* – In a method compatible with that used by Park *et al* [5] we ascertain a participant’s propensity to confirmation bias through the same news story evaluation task as used in *RQ2* where the six stories are further categorized into three pairs. Each pair contains a high quality and low quality story. The first pair being strongly positive in tone, the second pair neutral and the third pair being strongly negative. Confirmation bias is measured through participants selecting those stories with sentiments aligning with their own, irrespective of the quality of the story itself. Further cross validation of any propensity to confirmation bias is afforded recording the length of time participants spend reading each

story based on works by Knobloch-Westerwick & Meng [11] which indicated that participants are likely to spend 36% longer reading information that aligns with an existing belief.

The hypothesis, proposed by Park *et al*, as to participants with higher (self) perceived knowledge being more prone to confirmation bias can also be tested by simply correlating these two measures with the participant’s own rating of their expertise.

#### V. FUTURE WORK

The study of the relationships between information and financial instrument pricing/volume is still remarkably popular in economics. To enable a more nuanced insight into this relationship - beyond a simplistic case of news predating or postdating pricing changes - investigation is required in two key areas. Firstly, whether other biases might also impact upon the trust model. Secondly, how different features of news stories impact upon those biases. Further work will also look to extend beyond news reporting to social discourse as another information source. These insights will provide one possible rationale for how and why information is related to market movements along with a potential vector by which those movements might be both anticipated and manipulated.

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