Legitimizing Bitcoin as a Currency and Store of Value: Using Discrete Monetary Units to Consolidate Value and Drive Market Growth: Open Review

Chad Albrecht,* Steven Hawkins,† Kristopher McKay Duffin‡

Reviewers: Reviewer A, Reviewer B

Abstract. The final version of the paper "Legitimizing Bitcoin as a Currency and Store of Value: Using Discrete Monetary Units to Consolidate Value and Drive Market Growth" can be found in Ledger Vol. 5 (2020) 1-10, DOI 10.5915/LEDGER.2020.167. There were two reviewers involved in the review process, neither of whom have requested to waive their anonymity at present, and are thus listed as A and B. After initial review by Reviewers A and B, the submission was returned to the authors with feedback for revision (1A). The authors responded (1B) and resubmitted their work. It was once again sent to Reviewers A and B, who indicated that the revisions made were sufficient to address their concerns, thus ending the peer review process. Author responses are bulleted for clarity.

1A. Review

Reviewer A

Does this paper represent a novel contribution to cryptocurrency or blockchain scholarship?

Yes

If you answered "yes" to the previous question, in one sentence, describe in your own words the novel contribution made by this paper:

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† S. Hawkins is an Assistant Professor of Accounting at the Dixie L. Leavitt School of Business at Southern Utah University,
‡ K. McKay Duffin is a Research Associate in the Jon M. Huntsman School of Business at Utah State University.

Novel method to increase bitcoin usage/trustworthiness

Is the research framed within its scholarly context and does the paper cite appropriate prior works?

Yes

Please assess the article's level of academic rigor:

Excellent (terms are well defined, proofs/derivations are included for theoretical work, statistical tests are included for empirical studies, etc.)

Please assess the article's quality of presentation:

Excellent (the motivation for the work is clear, the prose is fluid and correct grammar is used, the main ideas are communicated concisely, and highly-technical details are relegated to appendixes).

How does the quality of this paper compare to other papers in this field?

Top 10%

Please provide your free-form review for the author in this section:

Frankly, this paper was a pleasure to read. It makes a unique suggestion for the improvement of the perceived value and usability of bitcoin. It is well-written, logical, and concise. It identifies the pertinent studies/literatures and effectively builds upon them with its contribution.

The only suggestion I might make (and this is only a suggestion) pertains to the central issue this paper addresses- the TRUSTWORTHINESS of bitcoin in the eyes of consumers. The paper clearly states that this is the problem it is trying to help with, but I might suggest that the authors consider utilizing psychological trust theory (e.g. Mayer, Davis and Schoorman, 1995) as they explain the dilemma currently faced with bitcoin. Referring briefly to trust theory as an additional framework from which the dilemma can be viewed/explained and then explaining how the proposed solution to this dilemma (the key contribution of this paper) satisfies the current gap in consumer trust, would, in my opinion, clarify this paper's contribution, or at least make it more salient in the readers' minds.

Reviewer B

Does this paper represent a novel contribution to cryptocurrency or blockchain scholarship?

Not sure

Is the research framed within its scholarly context and does the paper cite appropriate prior works?

Important references are missing

Please assess the article's level of academic rigor:

Unsatisfactory (better than poor but a long way from excellent)

Please assess the article's quality of presentation:

Good (not excellent but a long way from poor)

How does the quality of this paper compare to other papers in this field?

Top 20%

Please provide your free-form review for the author in this section:

The authors apply the whole number bias to provide a rationale to change bitcoin nominal form so that it has at most 2 decimal places. Changing the nominal form is not a new proposal, as explained by the authors. The originality of this paper, and the reason why I like it, lies in that it is a novel application of a well-known fact in cognitive science: people prefer to manipulate whole numbers. It is an opinion paper. Please be explicit at the intro. and abstract about its nature.

The following interrelated issues have to be addressed for this paper to be acceptable:

1) The application of the whole number bias to bitcoin seems superficial. For instance, an alternative hypothesis is that the whole number bias could favor the use of bitcoin as it is. For instance, spending 0.001 for a coffee should be for the mind great as it is much less than any whole number. In fact, there are countries that have moved from large numbers to smaller ones (e.g. Peru and Mexico have dropped zeroes from their currencies in the past). Under such hypothesis, the question becomes why aren't people embracing bitcoin faster? The authors should consider and thoroughly discuss this alternative hypothesis in the revised paper; even if they do not agree with it; by opposing it they would enhance their own.

2) Related to the previous point, the section devoted to the whole number bias is particularly short and superficial (What is whole-numbe bias?). The whole number bias is a complicated phenomenon. For instance, Boyer (2008), Dev. Psych, found that proportional reasoning in children mostly fails with discrete number but not with continuous quantities. It is unclear why but should we make bitcoin transactions with continuous metrics then? e.g. a sliding bar on-screen? Also, there are at least three explanations for the whole number bias: A) education (which the authors mention briefly via the idea of conceptual restructuring) B) Spontaneous property of the brain that uses all available information (e.g. Alonso-Diaz, Piantadosi, Hayden, & Cantlon, 2018, JEP:HPP) C) Strategic because computing proportions is metabollically costly and slow (e.g. Fazio, DeWolf, & Siegler, 2016, JEP:LMC). Thus, should

we change the denomination of bitcoins or improve education, or disincentivize the use of whole numbers when dealing with bitcoins?

3) There are other strains of literature that have address the problem of nominal values. In economics, for example, the money illusion is a well-documented cognitive phenomenon (e.g. Fehr & Tyran, 2001, 2014, American Economic Review). In psychology there are thoughtful papers on the effect of nominal values on transactions and economic behavior (e.g. Shen and Urminsky, 2013, Psych. Science; Furlong & Opfer, 2009, Psych. Science; Schley & Peters, 2014, Psych. Science; Kanayet, et al., 2014, Psych. Science, etc, etc, etc). These and other papers should be cited as support of why it makes sense to change the nominal representation of bitcoin. The whole-number bias in your paper is an excuse to talk about the need to reduce decimal points because the nominal representation matters. This is fine, but the way you wrote the paper the whole number bias is just the tip of the iceberg because your point is about nominal representations, more than whole number biases; they do matter but the importance of nominal representations in the mind is more general. In other words, is not clear why you focused on the whole number bias. Please be clear why you think is particularly important.

Other minor observations:

A) You introduce your paper by saying that the whole number bias is from the mathematics field. Change this in the introduction and abstract. It comes from cognitive and educational psychology. The reader may get confused and think that you will use a theory from mathematics rather than a psychological effect.
B) In page 2 you mention that in 2018 the value of bitcoin was between 3000-20000. Please clarify the currency (USD).
C) In page 3 you mention relational modeling. Give a brief explanation to the reader what is relational modeling.
D) In page 3 you mention that "a rational number with a greater number of digits after the decimal point will have a lesser magnitude than a rational number with fewer digits after the decimal point" … this is not true or is too ambiguous, I don't know what you mean (e.g. 345.9999941232 is greater than 345.10). When you say after, are you reading left-to-right? Or right-to-left? It is confusing what you meant here.
E) In page 3, why do you say that at most two decimal places? Is there literature on that? If so cite it, if not drop this claim, it does not make sense.
F) Section 3 feels like is there to fill up paper space. It reads like an extension of the introduction.
G) Section 4. You use Reddit as a source but it seems strange in an academic paper. Who are these Reddit users? They do have ideas related to your own but it was poorly justified the use of Reddit comments. Are these users the first to came up with these ideas? Are there other papers that cite them? Justify this source better or find other sources.

1B. Author Responses

Reviewer A

Does this paper represent a novel contribution to cryptocurrency or blockchain scholarship?

Yes

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- Response: We appreciate this feedback and agree that psychological trust theory would add another dimension to the theoretical rigor of the paper.
- Changes Made: We added psychological trust theory as an additional frame in the paper on pgs. 5-6 which analyzed the trust relationship between consumers and Bitcoin which included trust level, the trust circle, levels of commitment in the trust relationship, how trust functions in relation to technology, etc.

Referring briefly to trust theory as an additional framework from which the dilemma can be viewed/explained and then explaining how the proposed solution to this dilemma (the key contribution of this paper) satisfies the current gap in consumer trust, would, in my opinion, clarify this paper's contribution, or at least make it more salient in the readers' minds.

Reviewer B

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- Response: We agree with you that Whole number bias is a complex phenomenon with many underlying causes.
- Changes Made: We addressed the other possible causes of WNB on pgs. 3-4 that you suggested. We also found an additional cause of WNB that centers on individual perception of numerical magnitudes, which we then connect back to the need to change the nominal representation of Bitcoin.

3) There are other strains of literature that have address the problem of nominal values. In economics, for example, the money illusion is a well-documented cognitive phenomenon (e.g. Fehr & Tyran, 2001, 2014, American Economic Review). In psychology there are thoughtful papers on the effect of nominal values on transactions and economic behavior (e.g. Shen and Urminsky, 2013, Psych. Science; Furlong & Opfer, 2009, Psych. Science; Schley & Peters, 2014, Psych. Science; Kanayet, et al., 2014, Psych. Science, etc, etc, etc). These and other papers should be cited as support of why it makes sense to change the nominal representation of bitcoin.

- Response: We appreciate this perspective and address the consumer's perception of Bitcoin's nominal representation in a psychological frame.
- Changes Made: We explored on pgs. 5-6 how the perceptions of nominal representation are generated from misjudging unfamiliar magnitudes to perceiving certain representations as having greater economic reward.

The whole-number bias in your paper is an excuse to talk about the need to reduce decimal points because the nominal representation matters. This is fine, but the way you wrote the paper the whole number bias is just the tip of the iceberg because your point is about nominal representations, more than whole number biases; they do matter but the importance of nominal representations in the mind is more general. In other words, is not clear why you focused on the whole number bias. Please be clear why you think is particularly important.

- Response: We agree with this statement. We added additional emphasis on why we focused on WNB.
- Changes Made: On pgs. 3-4 we connect how our focus on WNB relates to the underlying cause of the bias itself: individual perception of numerical magnitudes.

Other minor observations:

A) You introduce your paper by saying that the whole number bias is from the mathematics field. Change this in the introduction and abstract. It comes from cognitive and educational psychology. The reader may get confused and think that you will use a theory from mathematics rather than a psychological effect.

- Response: We agree with your statement and implemented the changes.
- Changes Made: We eliminated the mention of whole number bias originating in the mathematics field from the introduction and abstract.

B) In page 2 you mention that in 2018 the value of bitcoin was between 3000-20000. Please clarify the currency (USD).

- Response: We agree with this statement and implemented the changes.
- Changes Made: We mentioned the value of Bitcoin was in USD on pg. 2.

C) In page 3 you mention relational modeling. Give a brief explanation to the reader what is relational modeling.

- Response: We appreciate the feedback about reader clarity.
- Changes Made: A brief explanation for relational modeling was provided on page 3.

D) In page 3 you mention that "a rational number with a greater number of digits after the decimal point will have a lesser magnitude than a rational number with fewer digits after the decimal point" … this is not true or is too ambiguous, I don't know what you mean (e.g. 345.9999941232 is greater than 345.10). When you say after, are you reading left-to-right? Or right-to-left? It is confusing what you meant here.

- Response: We understand your initial confusion and changed the sentence.
- Changes Made: The sentence on page 3, is changed to, "An increased number of digits after the decimal point does not result in a proportional increase in magnitude."

E) In page 3, why do you say that at most two decimal places? Is there literature on that? If so cite it, if not drop this claim, it does not make sense.

F) Section 3 feels like is there to fill up paper space. It reads like an extension of the introduction.

G) Section 4. You use Reddit as a source but it seems strange in an academic paper. Who are these Reddit users? They do have ideas related to your own but it was poorly justified the use of Reddit comments. Are these users the first to came up with these ideas? Are there other papers that cite them? Justify this source better or find other sources.