

# Ride the Lightning: Turning Bitcoin into Money

Anantha Divakaruni & Peter Zimmerman

XXV Meeting of the Central Bank Researchers Network  
CEMLA & Banco Central del Uruguay  
October 28-30, 2020

Discussant:

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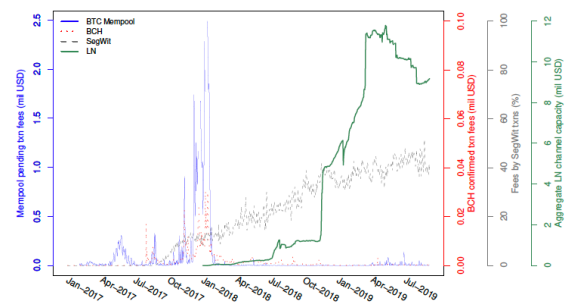
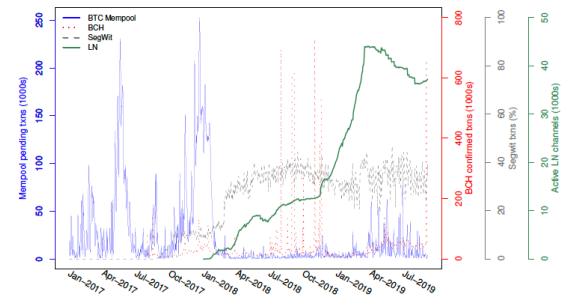
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# Key messages

- *We find a robust and significant association between reduced blockchain congestion since the beginning of the 2018, and adoption of the Lightning Network—a means of [off-chain] netting payments of the blockchain.*
- *We show that the Lightning Network has become increasingly centralised, as payments are steered through a small number of highly connected intermediaries. But competitive forces should prevent the network from becoming totally centralised.*

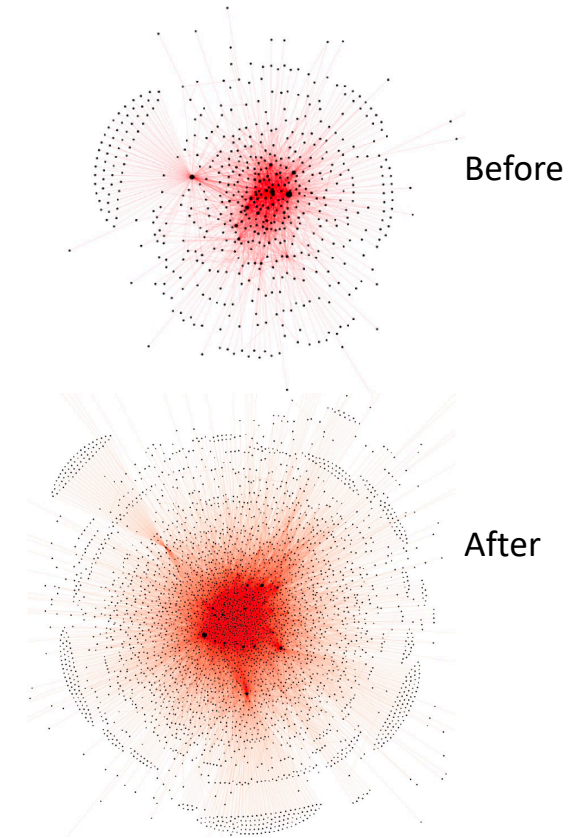


# My opinion

- The subject is interesting, timely, and very relevant.
- Well-written, straightforward, focused, enjoyable.
- It allows an easy reading for non-experts.
- Key messages are clear and interesting.
- I think some additional network analysis metrics could provide more insights.
- I would like the authors to discuss why LN could turn BTC into money—because the success of LN does not achieve usage of BTC as “electronic cash”. This is my “(?)” in the title.

# My questions & suggestions

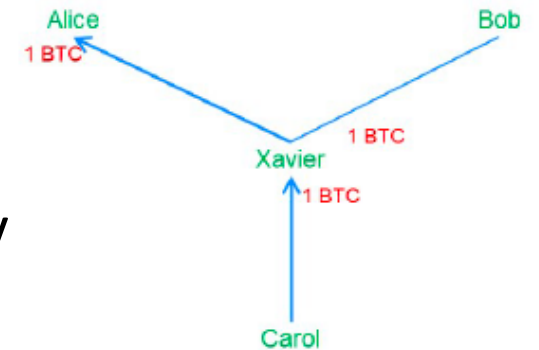
- Graphs are great. Nodes' centrality (i.e. point centrality) is helpful. But using *structural* or *graph centrality* (see [Freeman, 1979](#)) would be better to measure and compare how centralized LN networks are.\*
- What is a good fit to the distribution of linkages? Power-law? The large number of elements and linkages allows for fitting this distribution—it is interesting to find out.
- Are these networks *ultra-small* ([Cohen & Havlin, 2003](#))? I think they are: observed average path lengths are much lower than  $\ln(N)$  ... closer to  $\ln(\ln(N))$ .



(\*) [Freeman \(1979\)](#): regardless of the underlying centrality method, to measure the extent to which the centrality of the most central vertex exceeds the centrality of all other vertices, (ii) expressed as a ratio of that excess to its maximum possible value for a graph containing the same number of vertices.

# My questions & suggestions (2)

- Is Xavier (in the examples) a primitive form of ACH?
- Will this primitive ACHs dominate the LN?
- Will this primitive ACHs merge into large ACHs?
- Can this centralization turn bitcoin into money? How?
- Are the main properties of money achieved (or at least closer) by using LN?
  - Store of value (to some extent, but the volatility is still a problem)
  - Means of payment (I don't see LN fostering widespread adoption)\*
  - Unit of account
- **The key is measuring BTC usage as payment instrument (i.e. excluding #hodling and exchange-related trades).**

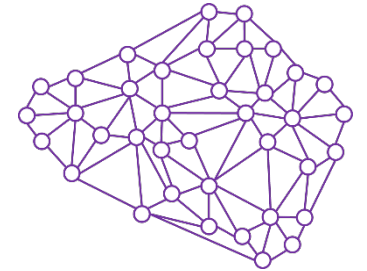


(\*) In my view, widespread adoption will not happen—unless the “last mile” is solved (i.e. putting BTC in each mobile phone with ease... Paypal?).

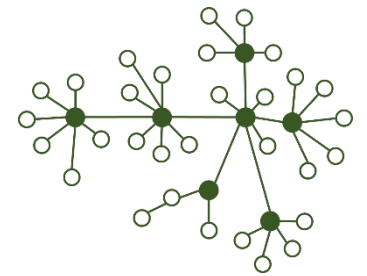
# My questions & suggestions (3)

- Is there some sort of *self-organization* that is pushing BTC away from the **distributed** dream of Nakamoto into the well-known **decentralized** structure of financial systems?
  - Only the ledger of transactions seems distributed (i.e. the blockchain)
  - Mining is not distributed but decentralized (e.g., pools, location)
  - The network of trades is not distributed but decentralized around a few centralizing exchanges (i.e., most trades are non-P2P)
  - Ownership concentration (i.e., the *whales*)
  - Developers exert extraordinary power (i.e., power is non-distributed)
- By the way, I prefer using the word **distributed** because **decentralized** is rather ambiguous. Besides, Nakamoto never used the word **decentralized**; he always used **distributed**—meaning completely decentralized.

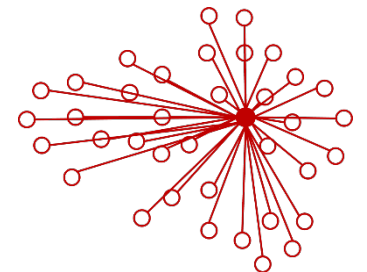
Distributed



Decentralized



Centralized



# Finally... is the title a subliminal message from Nakamoto?

- “Ride the lightning” is the name of an *article* by [Hetfield, Ulrich, Burton, Hammett, & Mustaine \(1984\)](#)\*.

*Guilty as charged*  
*But damn it, it ain't right*  
*There is someone else controlling me*

—————→ If the LN succeeds by **centralizing** the usage of BTC to achieve its adoption, is the original idea of a distributed system flawed?

*Someone help me*  
*Oh please God help me*  
*They are trying to take it all away*  
*I don't want to die*

—————→ Is the LN a **desperate way** for BTC to try to keep the “electronic cash” dream of Nakamoto alive? Even if LN’s non-distributed nature contradicts Nakamoto’s view?

(\*) A.k.a.  METALLICA



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