

# **Discussion of**

# ***Market Power and the Bitcoin Protocol***

*by Alfred Lehar and Christine A. Parlour*

Discussant: Leifu Zhang

AFA 2026

# Overview

- Very novel and solid work — I learned a lot!

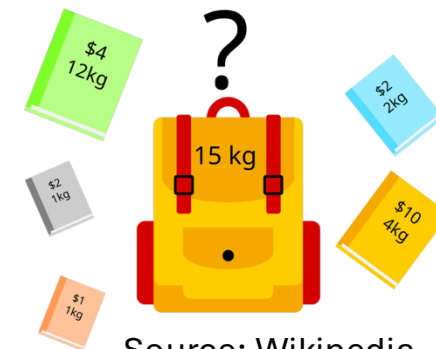
## **Stylized facts**

- Unused capacity: blocks are rarely at capacity even when transactions are waiting
- Priority violations: low-fee transactions get mined while higher-fee transactions remain in the mempool
- Fee dispersion is large within blocks
- Patterns strengthen when mining is more concentrated (HHI)

## **Interpretation: strategic capacity management (SCM)**

- Miners can't set fees, but they can ration block space by underfilling blocks and delaying low-fee transactions
- This creates waiting costs and changes user behavior: high-urgency users bid up fees to avoid delay, increasing fee levels/dispersion
- Large miners find it profitable intertemporally: give up some current revenue to raise future fees

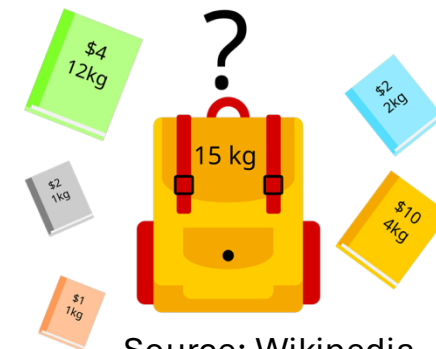
# Comment 1: Alternative Mechanism



Source: Wikipedia

- Block construction is a 0-1 Knapsack problem: choose a set of transactions to maximize fees subject to the block weight limit (*NP-hard!*)
- Even if every miner is myopic, any heuristic more sophisticated than “keep adding the highest-fee transactions until the block is full” can violate a simple “highest fee first” rule and produce both underfilled blocks, priority violations, and large fee dispersion
- Large pools are more likely to use sophisticated algorithms, so when concentration rises, these patterns may intensify **without strategic capacity management**

# Comment 1: Alternative Mechanism



Source: Wikipedia

- Build an “optimal” myopic benchmark block from the mempool data
- Residuals
  - Residual underfilling: benchmark block weight – actual block weight
  - Residual fee dispersion: fee dispersion relative to the benchmark
- Algorithm story: residuals are small/idiosyncratic and do not increase with HHI once benchmarked correctly
- SCM: systematic residual underfilling and fee dispersion remain and increase with HHI

# Comment 2: MLOT



- The paper's MLOT from bucketed mempool snapshots is an upper-bound-style measure
- Upper bounds can look large for mechanical reasons; a tight lower bound isolates the revenue that was truly available, so any remaining “left on the table” is harder to explain away

# Comment 2: MLOT



How to build it (and extend it back in time)

- In the period with transaction-level mempool data, compute an optimal “top-up” MLOT
- On the same blocks, use the paper’s bucket-based MLOT and measure how much it overstates
- Use that relationship as a calibration to convert the bucket-based MLOT into a conservative lower-bound MLOT for earlier years where only aggregated data are available

# Comment 3: Cross-Chain Validation

- SCM is a protocol-wide incentive problem abstracting away from Bitcoin-specific institutions
- Replicate the paper's stylized facts on other PoW chains
- If patterns reappear off-Bitcoin → stronger case this is an incentive feature of PoW block construction
- If patterns are absent or weak → suggests Bitcoin-specific mechanisms drive the results

# Conclusion

- This is a really novel and thoughtful paper, with an original mechanism and a clear set of empirical predictions
- The data work is impressive and the evidence is carefully assembled; I learned a lot from reading it
- The paper makes an important contribution and I expect it will be influential for how we think about miner incentives, fees, and market power in PoW systems

Thank you!