Discussion of
Market Power and the Bitcoin Protocol

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AFA 2026

Overview

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

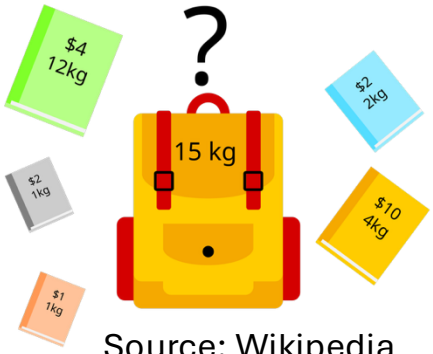
Stylized facts

- 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 and priority violations

- Large pools are more likely to use sophisticated algorithms, so when concentration rises, these patterns may intensify without strategic capacity management

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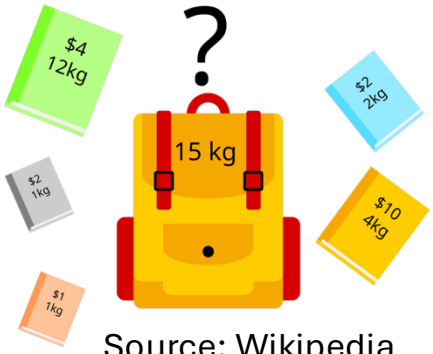

Source: Wikipedia

- Build an “optimal” myopic benchmark block from the mempool data

- Residuals
  - Residual underfilling: benchmark block weight – actual block weight
  - Residual priority violations: deviations relative to the benchmark (not a naive “highest-fee-first” rule)

- Algorithm story: residuals are small/idiosyncratic and do not increase with HHI once benchmarked correctly

- SCM: systematic residual underfilling and violations 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 abstract 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 production
- 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!