Happy to report that the main open theory question from my original work on EIP-1559 has been resolved (with two brilliant collaborators, Hao Chung and @ElaineRShi)---no transaction fee mechanism can be DSIC, MMIC, and OCA-proof! https://arxiv.org/pdf/2402.09321.pdf
(more context below) 1/7

DSIC: users have an "obvious optimal bid"
MMIC: miner/validator is instructed to maximize their fee revenue, has no incentive to insert fake transactions
OCA-proof: if miner + all users collude off-chain, they can't do better collectively than in canonical on-chain outcome 2/7

EIP-1559 satisfies all three properties as long as the base fee is high enough that all eligible transactions fit into a single double-size (30M gas) block. But if the base fee is too low, it effectively reverts to a first-price auction and loses DSIC 3/7

A variant that I called the "tipless mechanism" has the same set of properties, except that it loses OCA-proofness rather than DSIC when the base fee is too low. Obvious question: can we get all three properties, all the time, with no extra conditions? 4/7

Answer: no, even for randomized mechanisms! In this sense, the EIP-1559 and tipless mechanisms are "optimally incentive-compatible." 5/7

Caveat: this work considers the original, pre-MEV model for transaction fee mechanism design. Adding in MEV does change things:
https://x.com/Tim_Roughgarden/status/1676980165316886530
6/7

Independently, @Suflaky and @yaish_aviv
 proved a similar impossibility result for the case of deterministic mechanisms. Their paper is well worth reading, as their proof techniques are interesting and different from ours: https://arxiv.org/pdf/2402.08564.pdf 7/7