A couple of us community members on r/ethfinance (I'm u/Liberosist on Reddit) have been discussing the economic impacts of data shards. Starting with 64 shards made a lot of sense back when the plan was data first, but execution the final goal, and before EIP-1559, rollups, and the rollup-centric roadmap existed. So, are 64 shards still the best starting point? I don't know, but worth a discussion here.

As per current specifications, the Ethereum network will see a significant positive supply shock with ~18x greater data availability overnight. That is, assuming all transactions on the execution layer is data - realistically the difference will be even greater as there'll likely be other compute-heavy transactions on the execution layer, limiting space for rollup data; while shards are exclusively data. There are other factors at play - perhaps the execution layer's block gas limit will be higher than it is now, but you get the idea - it's an order of magnitude or greater.

Rollups will be well incentivized publish their data to shards immediately, and potentially the shard builder / proposer separation will make this transition even simpler. An order of magnitude is a significant shock, and has the potential to cause short-term instability in already volatile fee markets. With EIP-1559, and shards implementing 1559-like mechanisms, Ethereum's security is now intrinsically tied to fee markets. Over the long term, I fully believe demand will be induced, an equilibrium will be found in the fee markets, and the additional data availability will be saturated by rollups.

What if… we started off with, as an arbitrary example, 16 shards with 124 kB. This is 1/8th the current specifications, but still a significant 2.25x bump over execution layer's theoretical max data availability. As this is saturated, more shards and/or larger shards can be deployed incrementally.

I could be missing something technical, but my intuition is that this also means lower technical risk for this new system. I understand the protocol upgrade risk to expand data availability later, of course, so there's a trade-off there.

Finally, I'll address that the transition to rollups is quite gradual anyway. We've had application-specific rollups slowly gaining adoption over a year and a half now. Both Offchain Labs and Optimism are taking a measured approach starting off with rate limits, and incrementally increasing them over time. Infrastructure (CEX withdrawals/deposits, wallet UX etc.) and building trust will also take time. A gradual sharding rollout will be very much in line with what rollup users are already accustomed to.