

Arbitrum Gas Fees & Sequencer Revenue

The Arbitrum DAO has one of the largest treasuries by dollar denominated value in all of crypto, but less than 1% of the treasury is held in non-ARB assets (ETH and stablecoins). Between January-March 2024, the DAO was spending an average of 13.8M ARB per month, or roughly \$15M, with 90%+ of the spend going towards attracting users through protocol incentives programs. The risks associated with the DAO's current treasury structure are widely acknowledged (negative feedback loop where excessive ARB spend leads to price depreciation and therefore treasury devaluation), with many teams currently working on proposals for treasury management strategies.

However, there has been less conversation and research put into the topic of DAO revenue, which today is primarily driven through sequencer margin. Sequencer margin is the result of the difference between the fee charged to end users and the costs for data availability and settlement on Ethereum. The motivation behind this post can best be explained through two charts: Image 1 (H/t [@r3gen_Finance](#)) shows the DAO's ETH net fee flow between March 2023-March 2024, whereas Image 2 shows the same data set extended through May 2024.

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r3gen Arb ETH Treasury Flow

1266x578 65.1 KB

](<https://global.discourse-cdn.com/standard17/uploads/arbitrum1/original/2X/a/a5107d02ec4e22b284299a11ba5732a72ff63b07.jpeg>)

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](https://dune.com/David_C/arb-one-profits-and-ecosystem-stats)

As one can easily point out, the amount of ETH flowing into the DAO's treasury has essentially gone flat since the end of April 2024. The root cause of this was two protocol changes that came with the [ArbOS Atlas upgrade](#) on March 18, shortly after the implementation of EIP-4844 on Ethereum. The L1 surplus fee per compressed byte was lowered from 2 gwei to 0 gwei, essentially removing the L1 surplus fee altogether, and the minimum L2 base fee was reduced from 0.10 gwei to 0.01 gwei. While this has been a benefit to users, developers, and protocols, it has come at the expense of the Arbitrum DAO's primary revenue stream. We believe the reason for the mismatch in timing between the fall off in DAO revenue and the aforementioned upgrades was simply a delay in funds being officially transferred from the fee inbox to the [DAO's treasury timelock](#).

The following chart breaks down Arbitrum's fee revenue at a more granular level, which shows the significant decrease in daily revenue around the middle of March. The L2 base fee had historically served as the DAO's main revenue driver, but has been overtaken by L2 surplus fees since the ArbOS Atlas and EIP-4844 upgrades went live.

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](https://dune.com/queries/2914457/4843759?Select+Date+Granularity_e15077=week&Select+Timeframe_e15077=90)

For the 71 days between January 5 (2024) to March 17, the DAO generated ~2,125 ETH of profit. For the 71 days between March 18 and May 27, the DAO generated ~938 ETH of profit, with nearly half of that coming from a two day period in April where L2 Surplus Fees were abnormally high due to congestion fees kicking in. So even though a statistical outlier heavily skews the post-upgrade profit numbers to the upside, the DAO's ETH revenue was still down greater than 55% with higher day-to-day variance in DAO profit than the pre-upgrade era.

Meanwhile, Base and Optimism have begun to regularly surpass Arbitrum in weekly profit generation despite Arbitrum consistently seeing a higher level of onchain activity. It is worth noting that if changes were to be made to Arbitrum's gas pricing mechanism, it could put downward pressure on overall activity due to the increase in costs. However, another important factor to consider is the hefty amount of ARB incentives available across dozens of applications on Arbitrum, whereas Base (the most profitable Ethereum L2) does not have the luxury of a token. This begs the question – should the DAO charge slightly more for gas while incentives are plentiful in order to recoup some of the spend? Or is this approach missing the forest for the trees by focusing too heavily on short term profits over attracting and retaining users for the long-term in an effort to reach economies of scale?

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](https://dune.com/queries/2914457/4843759?Select+Date+Granularity_e15077=week&Select+Timeframe_e15077=90)

Popular transaction types, such as a Uniswap swap, already [cost](#) 2-5x less on Arbitrum than OP Stack chains on most days.

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Uniswap Swap Fee 7D MA

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The following table taken from the Paradigm team's recent [research](#) on Reth outlines target gas parameters across leading EVMs.

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Gas Targets

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The target gas per block is in practice where congestion pricing kicks in. The lower the target gas, the more quickly L2 surplus fees begin to scale. Interestingly enough, Base contributors [recently](#) increased its target gas per block in order to scale up to 6.25 mg/s, and is aiming to increase it again soon to achieve 7.5 mg/s. So it appears the Base team favors the "lower fees, reach economies of scale" approach mentioned above. OP Stack chains do not apply a hard-coded minimum L2 base fee as Arbitrum does, but instead have a maximum base fee increase or decrease per block (2% and 0.4% respectively as default) that adjusts based upon how far above or below a given block is from the predefined gas target (5M target gas per block by default). Arbitrum leverages something similar to OP Stack chains, as both mechanisms mimic EIP-1559 in many ways, called a "backlog" that monitors gas usage against a "speed limit" in an effort to ensure long-term sustainability by avoiding excessive gas usage. The base fee increases exponentially if the backlog grows, but decreases as the backlog shrinks. [Quoting the documentation](#), " $F = \exp(-a(B-b))$ ", where a and b are suitably chosen constants: a controls how rapidly the price escalates with backlog, and b allows a small backlog before the base fee escalation begins".

Another key difference between OP Stack chains and Arbitrum is that Optimism orders transactions based on priority fees, whereas Arbitrum operates its sequencer using the FIFO model. According to this [query](#), Optimism saw 25% of transactions over the past 30 days use a priority fee greater than 0.10 gwei, which ironically is where the Arbitrum minimum L2 base fee was set prior to Atlas. To provide a more detailed explanation of the impact of priority fees, we can look at the following spike on Base for "fast" priority fees at 15:31 UTC on May 29.

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](https://dune.com/payton/base-l2-gas-price-tracker)

This is what blocks typically look like on Base:

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](https://basescan.org/blocks)

However, at the time of 15:31 UTC on May 29, blocks were consuming far more gas, and priority fees escalated as a result (for those curious, the cause looks to be related to a gas intensive, ERC-4337 related operation coinciding with a public NFT mint):

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This priority fee auction appears to be a large driver of OP Stack chains' sequencer revenue, and could potentially be explored for Arbitrum.

More research needs to be conducted on the exact inner-workings of Arbitrum's gas pricing mechanism in order to make any concrete recommendations. It appears to Entropy Advisors that there are 3 paths to effectively increasing fees:

1. Increase the L2 minimum base fee from 0.01 gwei to something agreed upon by the DAO. In our opinion, this is the simplest option and is the least likely to have negative effects on various ecosystem participants.
2. Decrease the target gas per block, effectively kicking in congestion fees earlier.
3. Adjust the " a " in the exponential backlog formula ($F = \exp(-a(B-b))$) to increase the rate of change to the base fee during times of congestion.

Adjusting constant " a " has the benefit of letting the market decide the gas price, but it could have significant consequences if implemented irrationally. On the other hand, simply raising the minimum base fee would have more predictable effects, but

some folks prefer the free market to price resources. Adjusting the target gas per block would likely have similar advantages and drawbacks as adjusting constant “a” in the aforementioned exponential function of the backlog. Again, significantly more research and backtesting is required before we attempt an executable proposal, but we wanted to get the conversation started considering the disparity in ETH sequencer earnings between Arbitrum and other leading Ethereum L2s. Doubling down on this...

Arbitrum has more than twice as much TVL than any other rollup.

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](<https://www.growthepie.xyz/fundamentals/total-value-locked>)

Regularly sees higher DEX volume than any other rollup.

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](<https://defillama.com/dexs/chains>)

Has a higher stablecoin market cap than any other rollup.

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](<https://global.discourse-cdn.com/standard17/uploads/arbitrum1/original/2X/6/63cd675302169084e9efabbf758e93342308f4b0.png>)

Uses just as much L2 native gas as Base, and more than Optimism.

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](<https://dune.com/msilb7/l2-benchmarks>)

More addresses interacting with dapps each day than any other rollup.

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](<https://dune.com/msilb7/l2-benchmarks>)

So while the fundamental activity of Arbitrum looks fantastic, we are still not bringing in nearly as much revenue as the competition. Maybe this is a bad thing, or maybe it is a good thing! But we believe it is worth highlighting the situation to the broader DAO on the forum.

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Entropy Advisors' View

Entropy Advisor's opinion is that raising the minimum L2 base fee from 0.01 gwei to 0.02 gwei is the optimal path forward given the fact that we have seen it 5x higher in the past without experiencing any problems. It's a small enough change that data could be collected and analyzed with more drastic changes being implemented later. It is also a relatively fast measure to implement barring the DAO voting process, so we could quickly begin accruing more ETH to the DAO treasury in the midst of heightened activity, and thus extending the DAOs runway and helping protect it against ARB price fluctuations. We feel this is the simplest way to increase DAO revenue without hurting dapps and users, but we look forward to the community's feedback on this matter!

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Arbitrum Daily Top Line Revenue

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As a rough exercise, we applied various L2 minimum base fees via a [Dune query](#) to simulate what sequencer revenue would have been since Atlas went live on March 18th. The DAO would have profited an extra 427 ETH @ 0.02 gwei minimum base fee, 1760 ETH @ 0.05, and 4016 ETH @ 0.1. The nuances around Arbitrum's fee mechanism likely render this backtest as

a loose approximation, and we would like to see more thorough analysis brought forth from the broader community before we attempt to submit an executable proposal to the forum.

Call To Action

Other important things to consider when evaluating Arbitrum's gas fee mechanism include:

- [Timeboost](#) and whether or not it could remove the need for any change entirely
- Experimentation occurring in other EVM implementations and what we can learn from it (both other L2s, client teams, and Ethereum researchers)
- At what price (dollar denominated at various ETH prices) do users become sensitive to transaction fees?
- Which use cases are driving transaction volume and gas consumption?
- Which use cases are driving transaction volume and gas consumption?
- Which stakeholders in the Arbitrum ecosystem could be negatively impacted by any specific gas mechanism parameter changes and how? (dapps or "good" bots in particular)
- What effect would higher demand for Blob space on Ethereum have on any changes made to Arbitrum's gas pricing mechanism?
- Is there anything being done by other VMs/L1s that could be applicable to Arbitrum's gas fee mechanism? Additional research does not need to be exclusively within the realm of other L2s.
- Almost certainly more to consider

If this is a topic that gets a lot of people in the DAO excited, we think that next steps should be to seek input from the broader community (delegates, other token holders, researchers, OCL and other developers at the dapp layer, etc.) on what the optimal direction is in terms of mechanism changes, and to provide Chaos Labs from the ARDC with specific mechanism(s) to backtest and research further. Depending upon the results of that research, we can decide (next) next steps as a community. If there is interest in a working group call around this topic, please indicate your interest by participating in the comment section below.