

# MEV auctions considered harmful

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Front-running is a persistent problem in blockchain-based markets. Someone, typically a miner, can look at the transactions we all submit to the chain, and can insert their own transactions ahead of ours, getting the best deals and leaving the rest of us with less value — or selling off the right to “jump the line”. Researchers (including one of our co-founders) coined the term “miner-extractable value” or MEV to refer to the amount of value that miners can suck out of the system by front-running. That is value that users would otherwise get.

What can be done about this? There are various technical and economic approaches to reducing MEV by making markets harder to front-run. But lately another idea has come to the fore: auctioning off the right to decide the order of transactions, and letting the winner of the auction front-run as much as they like.

The argument in favor of the practice goes something like this: Front-running is a fact of life. We wish we could eliminate front-running, but that’s just not possible. Miner-extractable value exists. We might as well capture that value and use it for something useful. So we’ll auction off the right to extract that value. The highest bidder buys the right to re-order transactions and front-run everyone. The price we get in that auction will be equal to the amount of MEV that an efficient party can extract (minus a small margin for profit). We can use that money to support public goods.

It sounds too good to be true. And it is.

MEV auction revenue isn’t free money — users have to pay for it

Everyone likes free money. But the funds “created” by an MEV auction don’t come from nowhere. Ultimately the money comes out of the pockets of users.

Here’s why.

Miner-extractable value currently goes to the miners. And the miners need to be paid, or they won’t keep mining. There is some amount of value that we need to pay to the miners to keep enough of them mining — otherwise the chain isn’t secure enough. We can debate how many coins the miners should get, but we can all agree that there is some number  $N$  of coins that we need to give to the miners for every block, to keep our chain secure. For simplicity, I’ll call that the “mining fee” although in practice it will be some mix of block rewards, transaction fees, and MEV. One way or another, users of the system are paying those fees, whether in gas, inflation, or value lost to front-runners.

Now, suppose that the miner-extractable value in the whole system is  $M$  coins per block. We have two options: (1) we can give the MEV to someone else, and make users pay  $N$  coins per block to compensate the miners, or (2) we can let the miners capture the  $M$  coins of MEV, and make users pay the miners an additional fee of  $N-M$  coins. Either way the miners are receiving  $N$  coins in total, which is just enough. But compare the two scenarios. If we want to take  $M$  coins worth of value away from the miners and auction it off to somebody else, then we have to charge users an extra  $M$  coins of mining fees.

The bottom line is simple. The  $M$  coins that we’re “creating” with the MEV auction are not free money. When we take those  $M$  coins away from the miners, we now need to charge users  $M$  coins more to compensate the miners. Users suffer from front-running, to the tune of  $M$  coins, and then they have to pay again — another  $M$  coins to compensate the miners for the loss of MEV.

The  $M$  coins of revenue aren’t free money; they’re a new tax on users.

This is no way to design a tax system

Now maybe you believe that users should be paying a tax to support public goods. That’s a defensible position. But should we be using this tax system? The answer is almost certainly no.

If you’re going to sit down and design a tax system, you have many choices to make. How big should the tax burden be? How should the tax burden be distributed across the population? Which items or activities should be taxed and which should not? These choices will have a profound influence on the impact and efficiency of your tax system, so it’s important to make them carefully and based on the best economic thinking.

There is an ideal level of tax revenue to collect, balancing your revenue goals against the distortions caused by the tax. It's very unlikely that the ideal tax size happens to coincide with the amount of MEV available on your chain.

There are better and worse ways to distribute the tax burden across your population of users. It's unlikely that taxing people in proportion to their use of front-runnable services is an efficient or fair distribution of the tax burden.

A tax system designed at random — or based on principles unrelated to the overall well-being of your users — is unlikely to be a good one. What you're likely to get is a tax burden that is too small or too large, that falls unfairly on a subset of users, and that inefficiently distorts economic activity on your chain.

In short, if you want a tax system, design a tax system.

#### Other costs and problems

If you're not already convinced that an MEV auction is a bad idea, here are a few more problems that have already been recognized:

- **Centralizing MEV extraction:** Currently miners can extract MEV, but different miners are in competition with each other and there will be costs and friction that complicate miners' attempts to sell off front-running position efficiently. Centralizing MEV extraction to a single party, who is presumably highly skilled at extracting MEV, creates a (possibly temporary) monopolist who will be able to squeeze out more revenue than a less-organized community of miners can get. Centralizing MEV extraction will make extraction more efficient — which is a bad thing because it means more front-running.
- **Censorship attacks:** The auction winner can simply ignore certain transactions for a long time, or ignore all transactions and effectively shut down all on-chain progress for as long as they're in the winner position. These attacks can be deterred by requiring a (presumably large) deposit from the winner, but that is expensive and might suffer from forms of griefing. Some systems allow such censorship attacks and merely try to limit the length of the censorship to (say) ten minutes. That still means that the current event ordering dictator can impose an extra ten minutes of delay on all of your transactions.

These additional problems are significant in their own right. But even if they were entirely solved, an MEV auction would still be a poorly designed tax on users. In short, there are plenty of good reasons to avoid MEV auctions.