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The multi-chain future is upon us. Modular architectures are coming to maturity across the ecosystem to scale bandwidth and throughput of cryptocurrency. One example of such is the Ethereum modular architecture, with its beacon chain, its execution chain, its Layer 2s, and soon its shards. These can all be thought as separate blockchains, heavily inter-connected with one another, and together forming an ecosystem.

In this work, we call each of these interconnected blockchains ‘domains’, and study the manifestation of Maximal Extractable Value (MEV, a generalization of “Miner Extractable Value”) across them. In other words, we investigate whether there exists extractable value that depends on the ordering of transactions in two or more domains jointly.

We first recall the definitions of Extractable and Maximal Extractable Value, before introducing a definition of Cross-Domain Maximal Extractable Value. We find that Cross-Domain MEV can be used to measure the incentive for transaction sequencers in different domains to collude with one another, and study the scenarios in which there exists such an incentive. We end the work with a list of negative externalities that might arise from cross-domain MEV extraction and lay out several open questions. We note that the formalism in this work is a work-in-progress, and we hope that it can serve as the basis for formal analysis tools in the style of those presented in Clockwork Finance [1], as well as for discussion on how to mitigate the upcoming negative externalities of substantial cross-domain MEV.

Access the full paper here: <https://arxiv.org/pdf/2112.01472.pdf>