Further Decentralizing Decentralized Finance

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Automated market makers (AMMs) are automata that trade assets on one or more blockchains. They typically rely on arbitrage agents to keep prices in line with prices set by a shared reference market.

But if there is no shared market? Consider a distributed system where a population of AMMs interact with a population of arbitrage agents who seek to profit from pairwise price differences between randomly-chosen AMMs. We give bounds on convergence rates, arbitrage profits, and the degree to which arbitrageurs can collude to set prices.

What if AMMs could capture arbitrage profits for themselves by rebalancing their pools directly? We give bounds on convergence rates, and the degree to which the AMMs can collude to set prices.

Joint work with Sergio Rasjbaum and Sam Devorsetz.

Maurice Herlihy has an A.B. in Mathematics from Harvard University, and a Ph.D. in Computer Science from M.I.T. He has served on the faculty of Carnegie Mellon University and the staff of DEC Cambridge Research Lab. He is the recipient of the 2003 Dijkstra Prize in Distributed Computing, the 2004 Gödel Prize in theoretical computer science, the 2008 ISCA influential paper award, the 2012 Edsger W. Dijkstra Prize, and the 2013 Wallace McDowell award. He received a 2012 Fulbright Distinguished Chair in the Natural Sciences and Engineering Lecturing Fellowship, and he is a fellow of the ACM, a fellow of the National Academy of Inventors, the National Academy of Engineering, and the National Academy of Arts and Sciences. In 2022, he won his third Dijkstra Prize. He is currently a Fellow Ambassadeur of the Centre national de la recherche scientifique (CNRS).

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