

Abstract

Decentralized finance, or DeFi, is an area of financial services provided and operated on a blockchain. The total trading volume in decentralized exchanges or DEXs exceeds \$4 Billion daily. Derivative trading has grown rapidly in the DeFi ecosystem and is one of the most popular DeFi services, with the total liquidity locked in derivatives trading being over \$1.8 billion. The DeFi ecosystem has much liquidity locked in derivatives trading, especially in perpetual swap contracts. Perpetual swaps are derivatives that let a trader speculate on the value of an asset. The algorithms and protocols that currently facilitate the trading of perpetual contracts are highly innovative; however, they face several problems. A major problem faced by the existing protocols is their insensitivity and failure to adapt to external market conditions and market volatility for an underlying asset. This project aims to explore, design, develop, and evaluate a mechanism that will enable an existing protocol to adapt to external market conditions for any asset speculated by a perpetual contract. This study specifically explores and implements a mechanism to configure existing virtual automated market-making protocols to allow them to adapt to external market conditions. This project designs and implements a configurable or dynamic virtual automated market maker (vAMM) protocol for a perpetual swap exchange. The configurable vAMM is built on top of a stock vAMM protocol design. Experiments are performed on the implemented configurable vAMM protocol to evaluate if the implemented protocol can solve the existing problem of market adaptation with the vAMM protocol. The evaluation of the developed configurable or dynamic vAMM protocol showed that the protocol could adapt to external market conditions. However, the evaluation also showed that the protocol is not a viable solution and introduces critical issues that disrupt the core functionalities of a perpetual swap exchange. The implemented protocol needs additional mechanisms to be developed to solve its limitations. It is found that addressing these limitations of the implemented protocol can render the dynamic vAMM protocol a viable solution. This study also discovers the impact of key parameters of an automated market-making protocol on perpetual swap exchanges and discusses the importance of these parameters. Finally, this research suggests an algorithm that would automate the process of configuring a vAMM protocol to help a perpetual swap exchange adapt to market conditions.