**What Is an Automated Market Maker (AMM)?**

You could think of an automated market maker as a robot that’s always willing to quote you a price between two assets. Some use a simple formula like Uniswap, while Curve, Balancer and others use more complicated ones.

Not only can you trade trustlessly using an AMM, but you can also become the house by providing liquidity to a liquidity pool. This allows essentially anyone to become a market maker on an exchange and earn fees for providing liquidity.

## What is an automated market maker (AMM)?

An automated market maker (AMM) is a type of decentralized exchange (DEX) protocol that relies on a mathematical formula to price assets. Instead of using an [order book](https://academy.binance.com/en/glossary/order-book) like a traditional exchange, assets are priced according to a pricing algorithm.

This formula can vary with each protocol. For example, Uniswap uses **x \* y = k**, where **x** is the amount of one token in the liquidity pool, and **y** is the amount of the other. In this formula, **k** is a fixed constant, meaning the pool’s total [liquidity](https://academy.binance.com/en/articles/liquidity-explained) always has to remain the same. Other AMMs will use other formulas for the specific use cases they target. The similarity between all of them, however, is that they determine the prices algorithmically.

## What is a liquidity pool?

Liquidity providers (LPs) add funds to liquidity pools. You could think of a liquidity pool as a big pile of funds that traders can trade against. In return for providing liquidity to the protocol, LPs earn fees from the trades that happen in their pool. In the case of Uniswap, LPs deposit an equivalent value of two tokens – for example, 50% ETH and 50% DAI to the ETH/DAI pool.

Why is attracting liquidity important? Due to the way AMMs work, the more liquidity there is in the pool, the less [slippage](https://academy.binance.com/en/articles/a-complete-guide-to-cryptocurrency-trading-for-beginners#what-is-slippage-in-trading) large orders may incur. That, in turn, may attract more volume to the platform, and so on.

The slippage issues will vary with different AMM designs, but it’s definitely something to keep in mind. Remember, pricing is determined by an algorithm. In a simplified way, it’s determined by how much the ratio between the tokens in the liquidity pool changes after a trade. If the ratio changes by a wide margin, there’s going to be a large amount of slippage.

## What is impermanent loss?

Impermanent loss happens when the price ratio of deposited tokens changes after you deposited them in the pool. The larger the change is, the bigger the impermanent loss. This is why AMMs work best with token pairs that have a similar value, such as stablecoins or wrapped tokens. If the price ratio between the pair remains in a relatively small range, impermanent loss is also negligible. On the other hand, if the ratio changes a lot, liquidity providers may be better off simply holding the tokens instead of adding funds to a pool. Even so, [Uniswap](https://academy.binance.com/en/articles/what-is-uniswap-and-how-does-it-work" \t "_blank) pools like ETH/DAI that are quite exposed to impermanent loss have been profitable thanks to the trading fees they accrue.

# ****Bancor****

[Bancor](https://storage.googleapis.com/website-bancor/2018/04/01ba8253-bancor_protocol_whitepaper_en.pdf) utilizes the concept of bonding curve to determine price. Bonding curve is the relation between the price of a token and its total supply.

**Pros:** Bancor allows single-sided liquidity deposition in certain pools, determined by Bancor governance. There is a limit to how much single-sided liquidity can be deposited, also determined by Bancor governance. Within limit, Bancor will supplement equal value of BNT token when users deposit single-sided liquidity in the form of the other token. This doubles the effective liquidity. If the limit is reached, if one wants to deposit single-sided liquidity, he has to wait for someone to withdraw single-sided liquidity, or someone to deposit single-sided liquidity in BNT.

Bancor protocol also compensates impermanent loss (will be discussed later) in the form of transaction fee earned on the BNT part when users deposit single-sided liquidity. If the transaction fee does not fully compensate impermanent loss, Bancor will mint BNT to make sure impermanent loss is zero.

**Cons:**All swaps need BNT token as an intermediary as explained above. We will experience slippage twice as a result. All liquidity pools consist of BNT and another token, because of the same reason, and thus lack diversity.

# ****Uniswap****

Uniswap uses Constant Product Market Maker (CPMM) to determine price.

**Pros:**Thefirst to implement a convex function of token numbers in the pool to determine prices.

**Cons:** Liquidity provision is even across all price ranges, meaning capital efficiency is low.

# Balancer

[Balancer](https://balancer.fi/whitepaper.pdf)⁸ extends 2-token pools of Uniswap V2 to multi-token pools. The value of each type of asset in a Balancer pool holds an invariant weight that adds up to 1. It is not hard to show that this is equivalent to the power product of the reserve number of each asset is a constant.

**Pros:**Balancer generalizes 2-token pools to multi-token pools, and introduces the SOR algorithm to achieve better prices for its users.

**Cons:** “A liquidity pool is only as strong as its weakest asset.” The more types of tokens in one pool, the higher the risk.

# Curve

Curve merges Constant Sum Market Maker (CSMM) and Constant Product Market Maker (CPMM) together to achieve lower price slippage. We can think of this algorithm as adding a constant price part to the Uniswap/Balancer model to make the resulting function pegged to a certain price.

**Pros:**By adding CSMM and CPMM together with dynamic weight, Curve’s StableSwap achieves very small slippage, ideal for stablecoins.

**Cons:**The price is always pegged at 1. The pool will be bought out if the market price significantly differs from the pool price. Therefore, StableSwap only works for stablecoins.

**Reference –**

<https://medium.com/anchordao-lab/automated-market-maker-amm-algorithms-and-its-future-f2d5e6cc624a>

Above link will provide details about many protocols in detail and will also provide how they work with their mathematical explanations.