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USE OF NON-FUNGIBLE TOKENS (NFT) AS OPTIONS CONTRACT ON PHYSICAL OR DIGITAL ASSETS

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Abstract—Non-fungible tokens provide ownership guarantees on an underlying asset to the holder of the token. NFT works on the block chain technology and does not need any intermediary or central authority to operate. We study one of possible applications of this technology – to have two parties enter into an options contract with a physical or digital asset as an underlier. The holder of the options contract can be validated through the NFT token.

Keywords—NFT, Derivatives, Options

I. INTRODUCTION

A. Non-Fungible Tokens

Non-Fungible Tokens commonly known as NFT, represents a virtual non-interchangeable data unit that is stored on a block chain network and can be traded by market participants. The most common block chain network used for NFT is Ethereum. It provides smart contract functionality that enables tracking the owner of a token as well as a regulated way to enable the owner to transfer assets into another account. It is to be noted however that Ethereum is just one of the providers of the specifications governing the NFT transactions, however it is not limited to just any one type of block chain network.

The network underlying NFT can be thought of as a public ledger which provides an authenticity certificate or a proof of ownership that can be verified publicly by anyone. This is achieved through a cryptographic block creation process governed by pre-determined rules either based on proof of work or proof of stake. Figure 1.a shows a sample units of blocks connected to each other through pointers containing the hash of the previous block and transaction information.

In essence, whoever owns the token can be regarded as the rightful owner of underlying contract. This is one of the most important aspects for our proposed use case. There is no governing entity needed to facilitate the transaction between two parties. This however comes with both advantages as well as risks that we will see later.

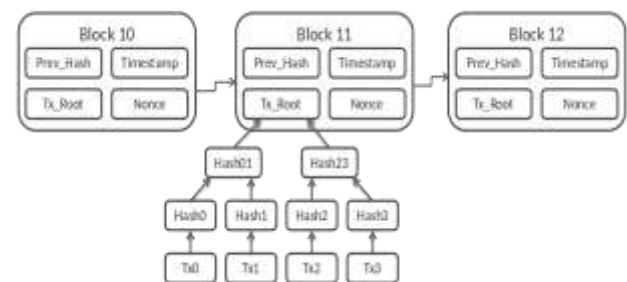


Figure 1.a – Individual blocks of a block chain network

B. Financial derivatives

In finance, derivatives refer to a contract between two parties whose value is dependent on the underlying asset. The underlying asset can be anything but mostly used are stocks, commodities and foreign exchange currencies. Derivatives are used for both speculation and hedging. They provide leverage over a given sum hence profits and losses are amplified.

One of the popular derivatives is known as an ‘options contract’. There are two fundamental types of options – Call and Put. A call option gives the buyer a right (but not an obligation) to purchase the underlying asset at a pre-determined price within a pre-determined time frame. The seller of the option sits on the other side and has an obligation to honour the contract. For this, the seller collects an option premium from the buyer at the start of the transaction. The put option works similarly and gives the buyer a right to sell the underlying asset instead of buying it.

Options’ trading is very popular and can be done on listed exchanges as well as Over the Counter (OTC). By combining various parameters of the options contract, different strategies can be formed that gives a known pay-off range based on all the possible outcomes. Figure 1.b depicts the pay-off diagram of a call bull spread strategy that is done by buying a call option with a specific strike price and expiration, and then simultaneously selling a call option with the same expiration but higher strike price.

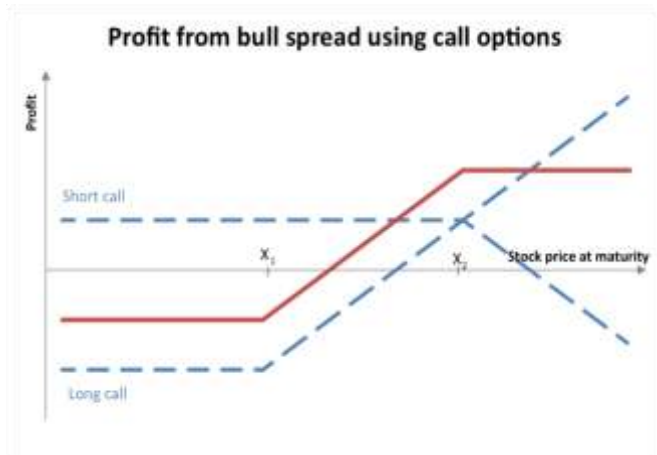


Figure 1.b – payoff diagram of a call bull spread

II.CURRENT NFT LANDSCAPE

As of writing this paper, NFT has been gaining a lot of traction amongst the professional investors and general public alike. There have been many high value transactions because of which it has caught the attention of a lot of people. As per the data from Non Fungible, there has been sales worth more than USD 500 million in NFT space already, with some popular projects such as Crypto Punks fetching more than USD 20 million. Figure 2.a shows the graph from Google trends depicting the popularity of NFT over time.

The most commonly used categories for NFT transactions are following:

- a. **Digital Art**—Some of the most expensive transactions in NFT space is from digital art category. In March 2021, an artist 'Beeple' sold a collage for \$69 million. This remains one of the most popular assets in NFT space. Although, there have been incidents where the artists have been seen selling someone else's work on NFT platform since there is no established method for checking copyright.
- b. **Music** —Like digital art, artists have been selling their music on the NFT network. While the music can be easily reproduced, the owner of the NFT can claim to be the original owner. Again, this does not mean that the owner has copyright over the asset.
- c. **Domain names** —Unlike traditional domains, NFT domains does not have a central registrar, rather they are based on smart contracts on the blockchain network.

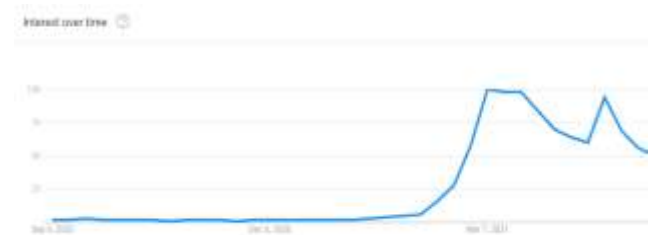


Figure 2.a – Popularity of NFT over time

III.PROPOSED APPLICATION

The proposal of this paper is that NFT technology can be used in the financial derivatives space with physical or digital assets as underlier. In particular, options contract using NFT (referred to as 'NFT based options' from here on) can have very useful applications.

Note that this is very different from derivatives on top of NFT in which case the underlier is the NFT itself. For example, CDZ exchange is exploring the use of NFT tokens in secondary derivatives market. In our use case, there would be following participants involved:

A. Seller

The seller of an NFT based option decides what underlying asset is to be traded and other options parameters like strike price and expiration. An initial price is then set as the option premium which the seller collects from the buyer. During this transaction, seller gets the money and buyer gets the NFT token proving the ownership of the contract. The seller has an obligation to deliver the underlying asset at the pre-determined price if the buyer chooses to execute the option within the time-frame.

B. Buyer

The buyer of the NFT based option has the right but not the obligation to purchase the underlying asset within the stipulated time at the strike price. For this, buyer pays the seller an initial premium and gets the NFT token that proves ownership. The decision of whether to actually execute the option or not would depend on the price of the underlying asset over the course of time.

C. Blockchain

Contrary to the regular options market, there will be no central exchange involved. The contract would be executed on a blockchain network based on smart contract. The resulting NFT token would provide the ownership guarantees. Ethereum remains one of most popular choice but any other blockchain could potentially be used.

There can be many more secondary transactions after the buyer and seller has executed the contract for the first time. In particular, the NFT token can easily change hands so the person who actually executes the option can be different than



the one who purchased it. The value of the secondary transactions would depend on the real or perceived fair value of the underlying asset.

A few of the many possible examples of this mechanism are listed below:

1. Companies launching a new product

Rather than going the traditional route of fixing a price first and then launching the product, companies can launch them as NFT based options before releasing the actual product. This is especially useful when the product is very new or experimental or when the company does not know how the customers would perceive the value of the product. The company could set the best guess value as the strike price and sell the options. The customers who hold the corresponding NFT tokens, would be able to purchase the underlying product at the set price. Based on the current market value of that NFT, the fair market value of the product can be determined which customers are ready to pay. This method of price discovery is not only effective but also serves as a marketing tool for the company.

2. Companies can provide dynamic subscription

Using the 'subscriptions' as an underlying asset of NFT based options, companies can provide this highly flexible option to their customers. When companies raise the price of their subscription, customers who bought the options can either enjoy the fixed price subscription themselves or sell it further for a profit. Even when the price of subscription remains the same, this can be a highly effective mechanism to transfer the company subscription from one owner to another.

3. Anonymous Stocks Trading:

In this form of trading, the underlying asset of the NFT based option is regular stocks, however there will be no central exchange involved. This would result in an anonymous exchange of stocks, given the shareholder could only be identified by the NFT token. This would not work well with the existing shares in the market and companies would have to issue a new category of NFT based shares. However, legal and regulatory risks have to be considered here too.

IV. POTENTIAL ROADBLOCKS

While the prospects for the NFT based options are exciting, there are a few potential issues that needs consideration. Some of these are not limited to the current proposal but NFT in general.

A. Copyright & Legal Issues

For the underlying asset of the NFT, it is very difficult to determine whether the seller is the rightful owner or has the necessary copyright. This means that it is possible for an NFT

seller to perform a fraud based on someone else's work. The buyers are the typical victim and there is no legal recourse they can take.

B. Environmental Impact

The Ethereum block chain under which most NFT are sold right now is currently based on proof of work which has been criticized for its environmental impact. The networks consume a lot of electrical energy that is required for mining. Many countries utilize fuel for the electricity generation which means it is responsible for worsening the climate change.

The new Ethereum 2.0 is being developed based on proof of stake rather than proof of work which should solve the above issue; however it comes with its own challenges.

C. Transaction charges

The transaction cost on the block chain network can be quite high. It is dependent on the prevalent demand and supply and how stressed the network is. On May 19 2021, average fee per transaction on Ethereum network went as high as USD 71. Using proof of stake network such as Ethereum 2.0 can solve this problem to a high extent.

D. Counterparty risk

In the NFT based options contract, seller has the obligation to deliver the underlying asset to the NFT token holder (buyer). However, given the absence of a legal contract and no central authority, seller can refuse to honour the contract without much implications, especially when the seller is not a reputed or well-known entity. The risk can be minimized by having another party as the mediator.

V. CONCLUSION

The prospects for options based NFT looks promising. There are many potential applications even far beyond what has been presented here. Especially when the potential issues discussed earlier are resolved, the acceptance and real-world use case will increase dramatically in the already popular NFT space.

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