An Introduction to Antimatter Token

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1 What is an option

An option is a financial derivative that grants the buyer the rights to buy and sell the underlying assets at a specific price within a period of time. A call option gives the buyer right to buy, while a put option allows the buyer to sell.

2 Antimatter token as a perpetual option

2.1 Main Goal

We aim to decide whether a particular cryptocurrency is bullish or bearish by using a financial derivative: perpetual options. We achieve this by tokenize perpetual options, so that investor can forge and trade these tokens. One can judge based on the indicator price which depends on the ratio of both types token forged. This ratio determines the pricing of tokens. The indicator price also creates opportunities for investor to take advantage from the difference between the market price and indicator price of that specific cryptocurrency.

2.2 Perpetual Option

A perpetual option is a non-standard option that can be exercised any time without expiration.

2.3 Generation and Redemption

Antimatter token is a perpetual option. There are two token types: call token and put token, which correspond to call and put perpetual options. To understand how they work, we have a price interval that contains the current price of a specific cryptocurrency and we anticipate that the price of the cryptocurrency will change within this interval. If we work with ETH and USDT and in case that the price varies within the interval, one can generate antimatter token(call and(or) put) by providing two types of underlying assets, such as ETH and USDT. Typically, one needs to provide more ETH to generate a call token and more USDT to generate a put token.

The redemption of tokens is simply exercising corresponding options.

2.4 Pricing of tokens

Given a price range $[F, C]$ within which the price of the specific cryptocurrency varies, where F is the strike price for call and C is the strike price for put. Let $c \in [F, C]$ be the indicator price of the cryptocurrency on the platform. Thus $c - F$ is the cost to generate a call token, while $C - c$ is the cost to generate a put token. Let x, y be the amount of call and put token respectively, and z be the total reserved value. The total reserved value is all the premium collected that are used too generated Antimatter tokens. We aim to build a model that z is a function of x and y, such that

$$\frac{\partial z}{\partial x} + \frac{\partial z}{\partial y} = C - F$$

Further restrictions are that both partial derivatives(prices of call and put tokens) lie within interval $[F, C]$. When the volumes of both tokens are equal, it is expected that the prices of both tokens are equal. When the volume of call tokens far exceeds the volume of put tokens, it is expected that the price of put token approaches C. When the volume of put tokens far exceeds the volume of call tokens, it is expected that the price of put token approaches F. A final note is that the price of both tokens depends on the ratio of volume of both tokens, rather than the difference between them.

For example, we work with ETH and USDT. We take nd the price of ETH in terms of USDT varies within the interval $[2000, 4000]$. Here \$2000 is the strike price of call, and \$4000 is the strike price of put. If the call token generated is three times put token generated, it is expected that the indicator price is \$3500 In this case, the cost to generate a call token is \$1500 and the cost to generate a put token is \$500. When there is a difference between the indicator price and market price of ETH, one can buy and sell call or put token in two market to make profit.

2.5 Mathematical modelling

The actual model goes as follows. Let

$$z = (C - F)\frac{x^2 + xy + y^2}{x + y}$$

where $(C - F)$ is the difference between the strike price of call and put token. We have

$$\frac{\partial z}{\partial x} = (C - F)\frac{x^2 + 2xy}{(x + y)^2}, \frac{\partial z}{\partial y} = (C - F)\frac{y^2 + 2xy}{(x + y)^2}$$

This model works well with prices of tokens. In particular, the price of each token fluctuates within $[0, C - F]$. However, the drawback is that the sum of prices of tokens given some cryptocurrency prices may be greater than $(C - F)$. It leads to a problem that when a trader try to hedge by generating both call and put tokens, he might lose value as the value of the cryptocurrency changes. For example, Let and we proceed with the specified model. If there is no call token generated, but put token is generated, the price of call token is \$0 and the price of put token is \$2000. The costs to generate two tokens are equal when the amounts of two tokens produced are exactly the same. In this case, each costs \$1500. If there is no put token generated, but call token is generated, the price of call token is \$2000 and the price of put token is \$0. If one needs to produce a pair, the maximum cost is \$3000 and

Floor	Cap	Call	Put	Underlyir	Currenc	priceUnder	∂z/∂x	∂z/∂y	∂z/∂x+∂z/∂y
1000	3000	0	1	0.0000	2000	1000	0	2000	2000
		0.001	0.999	0.0020	1996	1002	4	2000	2004
m	n	0.002	0.998	0.0040	1992	1004	8	2000	2008
1	1	0.005	0.995	0.0099	1980	1010	20	2000	2020
		0.01	0.99	0.0194	1960	1020	40	2000	2040
		0.02	0.98	0.0377	1922	1040	79	1999	2078
		0.05	0.95	0.0866	1810	1100	195	1995	2190
		0.1	0.9	0.1517	1638	1200	380	1980	2360
		0.2	0.8	0.2400	1344	1400	720	1920	2640
		0.3	0.7	0.2963	1106	1600	1020	1820	2840
		0.4	0.6	0.3378	912	1800	1280	1680	2960
		0.5	0.5	0.3750	750	2000	1500	1500	3000
		0.6	0.4	0.4145	608	2200	1680	1280	2960
		0.7	0.3	0.4608	474	2400	1820	1020	2840
		0.8	0.2	0.5169	336	2600	1920	720	2640
		0.9	0.1	0.5850	182	2800	1980	380	2360
		0.95	0.05	0.6241	95	2900	1995	195	2190
		0.98	0.02	0.6492	39	2960	1999	79	2078
		0.99	0.01	0.6579	20	2980	2000	40	2040
		0.995	0.005	0.6622	10	2990	2000	20	2020
		0.998	0.002	0.6649	4	2996	2000	8	2008
		0.999	0.001	0.6658	2	2998	2000	4	2004
		1	0	0.6667	0	3000	2000	0	2000

the minimum cost is \$2000. Generally, the cost of generating tokens does not linearly depend on the existing tokens, nor the ratio. The graph below gives a detailed illustration of our model.

2.6 Ratio of underlying assets

As usual, we let be the difference between the price floor(F) and price celling(C), be the call and put token generated respectively, x, y be the premium needed. We divide the premium into two parts: stable coin U and any cryptocurrency Ee, where E is the quantity and e is the price. Since stable coin preserves value, we may always assume that its price is 1. Then, we define the following:

$$U = K\frac{\frac{C}{C+F}xy + y^2}{x+y}, E = K\frac{\frac{F}{C+F}xy + x^2}{Cx+FY}$$

Using a calculator, we find that $\frac{\partial U}{\partial x} < 0, \frac{\partial U}{\partial y} > 0, \frac{\partial E}{\partial x} > 0, \frac{\partial E}{\partial y} < 0$. This feature agrees with our expectation in that generating more call tokens requires more cryptocurrency and less stable coin, while generating put tokens requires more stable coins and less cryptocurrency. It is required in case of exercising options.