Stable Coin Return Analysis

Relating Volatility to the Obtainable Return on Stable Coins

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Abstract

In volatile crypto markets, the price of a stable coin often fluctuates around its intended *pegged* value. This analysis relates the stable coin's volatility to the maximum potential return achieved by trading on the stable coin's price swings. Unlike other asset classes, the achievable return on stable coins, or any asset tied to a constant value, is found to be directly proportional to the sum of its price variance and covariance.

1. Analysis

For a general stable coin, its price is pegged to a constant value c. That is, there are active market forces maintaining the price at its pegged price and the price of the coin will predominantly hold this value. If its price is actively being maintained at c, then the average value μ of a stable coin's price will be equal to its pegged value. That is, we assume:

$$\mu = c \tag{1}$$

For any time the price deviates from its peg, it can be traded and the total return R_{TOT} is:

$$R_{TOT} = \sum_j (P_j - \mu)/\mu, \tag{2}$$

where P_j is the current stable coin price off the peg value. For simplicity, let's define the difference between the stable coin's price and peg value as Z_j or $Z_j = (P_j - \mu)$. To find a relationship between R_{TOT} and the volatility, we can make the following mathematical substitutions:

$$R_{TOT}^2 = \frac{1}{\mu^2}[\sum_j Z_j] \tag{3}$$

And letting $\mu^2 = 1$:

$$R_{TOT}^2 = \sum_j Z_j^2 + \sum_{j \neq i} Z_j Z_i \tag{4}$$

Now substituting in for Z_j, Z_i and multiplying by an identity:

$$R_{TOT}^2 = \sum_j (P_j - \mu)^2 + \sum_{j \neq i} (P_j - \mu)(P_i - \mu)$$

$$= \frac{N-1}{N-1} \times [\sum_j (P_j - \mu)^2 + \sum_{j \neq i} (P_j - \mu)(P_i - \mu)]$$

$$= (N-1) \times [\sigma^2(P_j) + Cov_{i \neq j}(P_i, P_j)] \tag{5}$$

or taking the root of both sides relates the total return to the variance and covariance:

$$\boxed{R_{TOT} = \sqrt{(N-1) \times [\sigma^2(P_j) + Cov_{i \neq j}(P_i, P_j)]}} \tag{6}$$

2. Skeleton Code

A code outline for running a trading bot on stable coins.

Skeleton Code:

```
def run(NOT STOP):
      peg = 1
      currency = "USD"
      stable_coin = "USDC"
      action = { 'BUY','SELL','HOLD' }
      fees
      cost_avg
      conditions = {}
      search = TRUE
      stop = FALSE
      current_price = get_price(stable_coin)

   while(search):
         previous_price = current_price
         current_price = get_price(stable_coin)
         difference = price_compare(current_price,
            previous_price)
         action_needed = action_needed(difference,
```

```
            conditions)
        if(action_needed):
            search = FALSE
        rest()
    if(action_needed == 'BUY'):
        API_request(buy_action)
        update(portfolio, cost_avg)
        search = TRUE
    if(action_needed == 'SELL'):
        API_request(sell_action)
        update(portfolio, cost_avg)
        search = TRUE
    if(action_needed == 'STOP'):
        stop = TRUE
```