

Project FireHawk

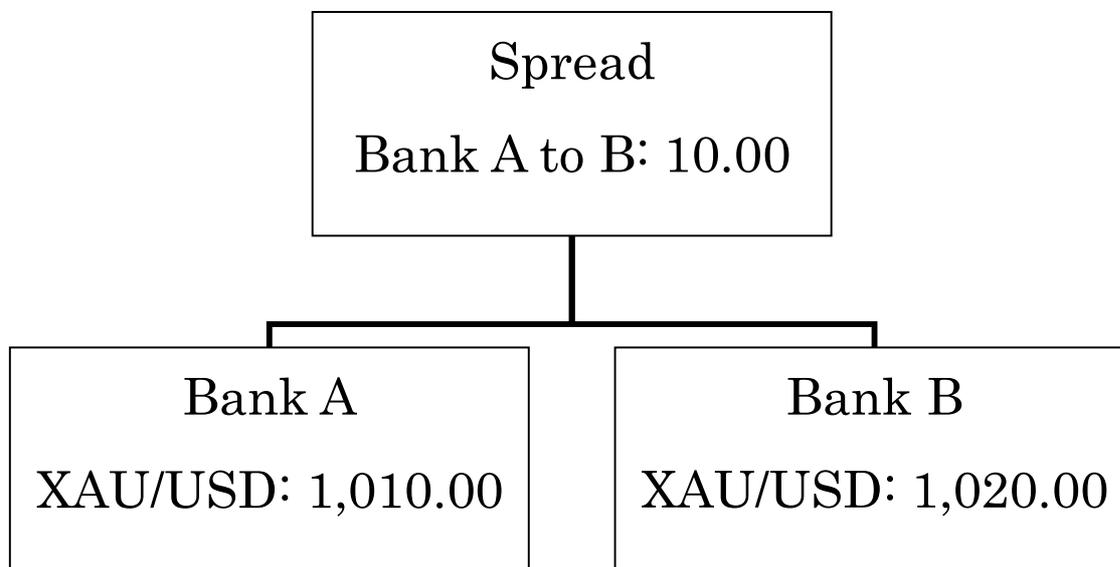
Arbitrage Bot

~ Contents ~

1. The Concept and Process of Arbitrage
2. Arbitrage and Bitcoin
3. Project FireHawk
4. Future Plans

1. The Concept and Process of Arbitrage

Arbitrage is the process of simultaneously purchasing and selling an asset at two different locations. Profits from arbitrage are made up of the differences in price between each locations. For example, if there are two banks offering a spot price for a commodity such as gold and one bank had a different price than the other, the difference in price would be called the spread. In arbitrage the spread is the amount of profit per transactions. This is a guaranteed return on the investment regardless of the base prices of the commodity.



In the above figure there are two banks offering quote prices on the symbol XUA/USD which is gold. Bank A has a current price of 1,010.00 United States Dollars. Bank B has a current price of 1,020.00 USD. The difference, or spread, between both banks is 10 USD. Through arbitrage, gold is simultaneously purchased on Bank A and sold on Bank B giving a net gain equal to the spread. This gain is realized from arbitrage at any rate. For example, if the price rose or dropped by 100 USD, so long as there was a difference in price at both banks, arbitrage would still be profitable.

2. Arbitrage and Bitcoin

Due to the current decentralized nature of Bitcoin trading, the market is highly susceptible to arbitrage. As it stands, the value of Bitcoin is made up of many different exchanges who independently trade Bitcoin and Fiat. Although the exchanges often follow each other in price, because they are disconnected and operate independently, no two exchanges will have the exact same price as each other.

| Symbol | Last | Chng (%) |
|----------|---------|----------------|
| BTCUSD | 294.81 | -0.50 (-0.17%) |
| BTCUSD | 295.09 | -0.46 (-0.16%) |
| BTCUSD | 291.47 | +0.47 (+0.16%) |
| BTCUSD | 293.65 | -0.36 (-0.12%) |
| BTCUSD1W | 296.50 | +0.10 (+0.03%) |
| BTCCNY | 1835.00 | -0.36 (-0.02%) |

Shown here from top to bottom are the exchanges: BitStamp, BitFinex, BTC-E and OkCoin.

Although each exchanges is open simultaneously, each exchange's trades are carried out sparately. As show BTC-E , 3rd from the top is roughly 3.26 USD cheaper than BitFinex, second from top.

As the prices fluctuate over time, the spread between each exchange as they use each other for price discovery the spreads tighten and expand. At the right time of the day BTC-E will be nearly 10 USD away from BitStamp or BitFinex, and at other times of the day will be 2 USD away.

3. Project FireHawk

Project FireHawk is designed to be an automated system for arbitrage between the Bitcoin exchanges BTC-E and BitStamp. The software makes use of a variable spread between the two exchanges in both directions to determine optimal prices for arbitrage. The project is also designed in such a way that if the spreads were to reverse in directions then FireHawk will also reverse its trading order. If BTC-E was lower than BitStamp and the two suddenly flipped prices, then the software would go from trading BTC-E->BitStamp to BitStamp->BTC-E.

The core of FireHawk is a cross-platform command line application featuring price tickers for both exchanges, a spread ticker for both trade directions, profit per lot and total profit.

```
[BTC-E] Checking Balance
[BTC-E] USD: 7860.18841353 BTC: 0 USD Pass: OK BTC Pass: OK
[BitStamp] Checking Balance
[BitStamp] USD: 0.00$ BTC: 0 USD Pass: OK BTC Balance: OK
[FireHawk] Trades: 5/0 Total Profit: 332.273
[BTC-E] Ask: 277.432 Bid: 278.025
[BitStamp] Ask: 284.790 Bid: 284.100
[BTC-E->BitStamp] Spread: 6.765$ Profit/Loss: 58.971$
[BitStamp->BTC-E] Spread: -6.668$ Profit/Loss: -58.024$
[BTC-E] Checking Balance
[BTC-E] USD: 7860.18841353 BTC: 0 USD Pass: OK BTC Pass: OK
[BitStamp] Checking Balance
[BitStamp] USD: 0.00$ BTC: 0 USD Pass: OK BTC Balance: OK
[FireHawk] Trades: 6/0 Total Profit: 391.244
[BTC-E] Ask: 277.432 Bid: 278.025
[BitStamp] Ask: 284.800 Bid: 284.090
[BTC-E->BitStamp] Spread: 6.775$ Profit/Loss: 59.071$
[BitStamp->BTC-E] Spread: -6.658$ Profit/Loss: -57.924$
[BTC-E] Checking Balance
[BTC-E] USD: 7860.18841353 BTC: 0 USD Pass: OK BTC Pass: OK
[BitStamp] Checking Balance
[BitStamp] USD: 0.00$ BTC: 0 USD Pass: OK BTC Balance: OK
[FireHawk] Trades: 7/0 Total Profit: 450.315
```

* Trades shown are simulated.

FireHawk calculates the profit per trade with trading fees accounted for. Additionally, FireHawk also checks the balances of both accounts for a minimum balance threshold. Should either account fail a balance check, the trade will be prevented. This prevents trade execution where no profit stands to be gained and minimalizes risks. The software also maintains time-stamped logs of both the ticker and each trade that is carried out.

Project FireHawk is easily configurable with a simple config.ini file.

[General]

CLEAR_SCREEN=FALSE - CLEAR_SCREEN when set to true, clears the terminal with each refresh of the ticker.
AUTO_TRADE=TRUE - AUTO_TRADE toggles the automatic trading ON/OFF.
AMOUNT=10 - AMOUNT is the amount of Bitcoin used for each transaction.
SPREAD=5 - SPREAD is the minimum difference of price that must be met for a transaction to be executed.

[BTC-E]

API_KEY= - API_KEY is the account's API key for the exchange.
SECRET= - SECRET is the associated API secret that matches the API key.
FEE=0.002 - FEE is the exchange's fee per transaction, used in profit calculation.
MIN_BTC=0 - MIN_BTC is the minimum Bitcoin balance that the account must have.
MIN_USD=0 - MIN_USD is the minimum USD balance that the account must have.

[BitStamp]

CLIENT_ID= - CLIENT_ID is the BitStamp API specific Client Identification number.
API_KEY= - API_KEY is the account's API key for the exchange.
SECRET= - SECRET is the associated API secret that matches the API key.
FEE=0.005 - FEE is the exchange's fee per transaction, used in profit calculation.
MIN_BTC=0 - MIN_BTC is the minimum Bitcoin balance that the account must have.
MIN_USD=0 - MIN_USD is the minimum USD balance that the account must have.

4. Future Plans

The future plan for Project FireHawk is to design a full interface, either GUI or Ncurses with on the fly configuration and manual trading. Additionally it is planned to expand the range of FireHawk into supporting multiple exchanges at the same time. There are also some plans to create a fully independent trading platform similar to a Forex platform using the exchange APIs.

Concept preview of HawkTrader:

