



WELCOME!

PLEASE COMPLETE THE FOLLOWING STEPS:

- Register using the following link: <http://tinyurl.com/yc8umf3h>
- 'Like' Akuna's most recent Instagram post (@akunacapital) and follow us on Facebook!
- Look at Akuna's website: [www.akunacapital.com/careers](http://www.akunacapital.com/careers) for our all of our job postings



# THE NEW WAVE

# IN TECH AND TRADING

Quant Trading and Research at Akuna Capital

Xiongjie Yu  
September 13, 2018

# Outline

- My background
- History of Akuna
- Intro to trading, options, and futures
- My experience (crypto and valuation research)
- Different roles at Akuna's quant trading and research team
- Leveraging your physics degree
- Q&A

# My background

- PhD in Physics at UIUC from Bryan Clark group, Dec. 2017
  - Worked on many-body localization systems
  - A big part of my research was numerical (C++, python)
- Interned at Akuna in Summer 2016, started full time in Jan. 2018
  - Option beta risk model
  - Crypto currency
  - Valuation research

## WHO WE ARE

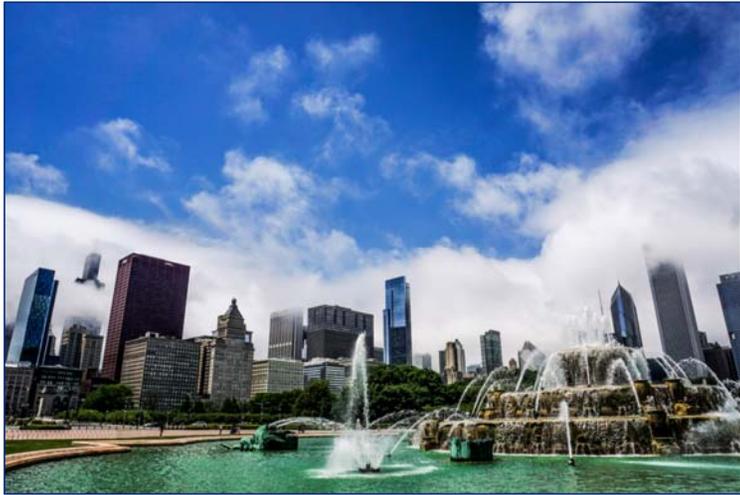
- Founded in 2011 by Andrew Killion (CEO) and Mitchell Skinner (Head of Trading).
- Akuna Capital derives its name from Akuna Bay in Australia where Andrew spent many weekends cycling and forming the concepts that would guide Akuna Capital's future.
- Provide liquidity to the derivatives market; primarily serving as options market makers

## WHAT WE DO

- Options Market Making
- Relative Value Trading
- Index Products
- Commodities



# AKUNA OFFICES



Offices in:

- Chicago, Illinois ~180
- Shanghai, China ~35
- Boston, Massachusetts ~ 5
- Sydney, Australia ~ 21

**Total ~241**



# Trading, Not Gambling

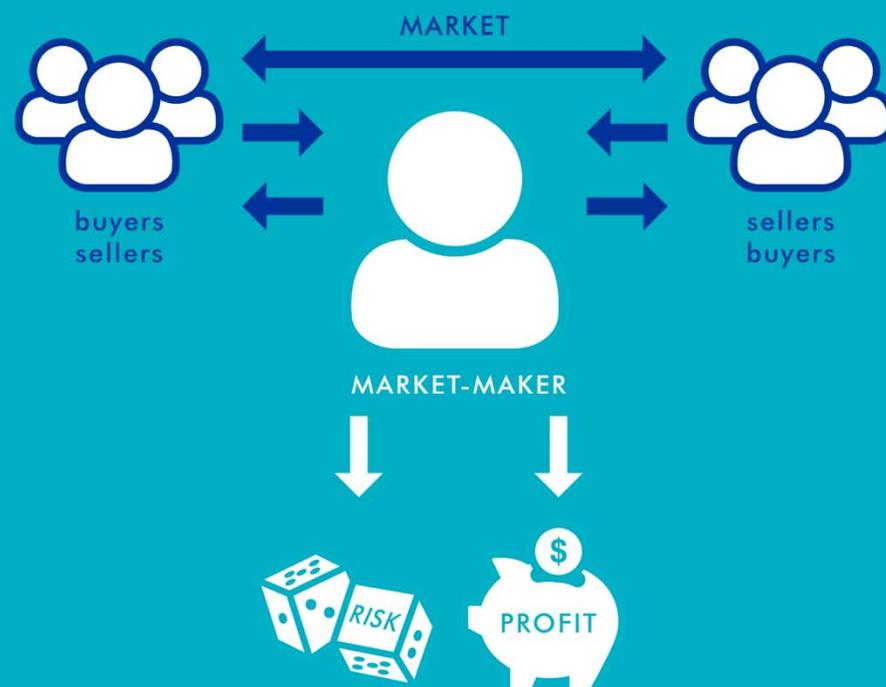
- Gambling:
  - “I am feeling lucky! All in!”
- Trading:
  - “I want to maximize profits of my strategies subject to risk constraints.”
    - Latency based strategies
    - Correlation based strategies

# Options and Futures 101

- Future:
  - A legal agreement to buy or sell something at \$K at time T
- Option:
  - The right, not the obligation, to buy (call) or sell (put) at \$K at time T
- Hedging:
  - Manage risk exposure by holding offsetting positions
    - “Buy 1 call and sell  $\Delta$  futures”

# OPTIONS MARKET-MAKING

- Buy/sell options to provide liquidity
- Try to capture price spread
- In practice to be profitable
  - Pricing
  - Speed
  - Signals
  - Risk management



# My Experience – Valuation Research

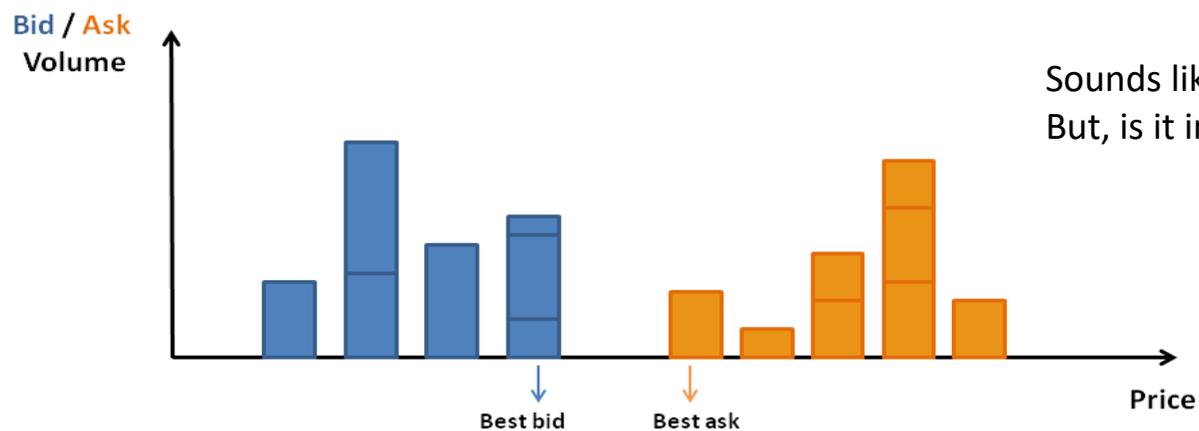
What is valuation?

- Fair price of an instrument
- Input to an option's price and delta hedging strategy
- Opinion about the current market condition

# My Experience – Valuation Research

## Why is it complicated?

- Price levels are discrete, people buy (“bid”) or sell (“ask”) at different prices

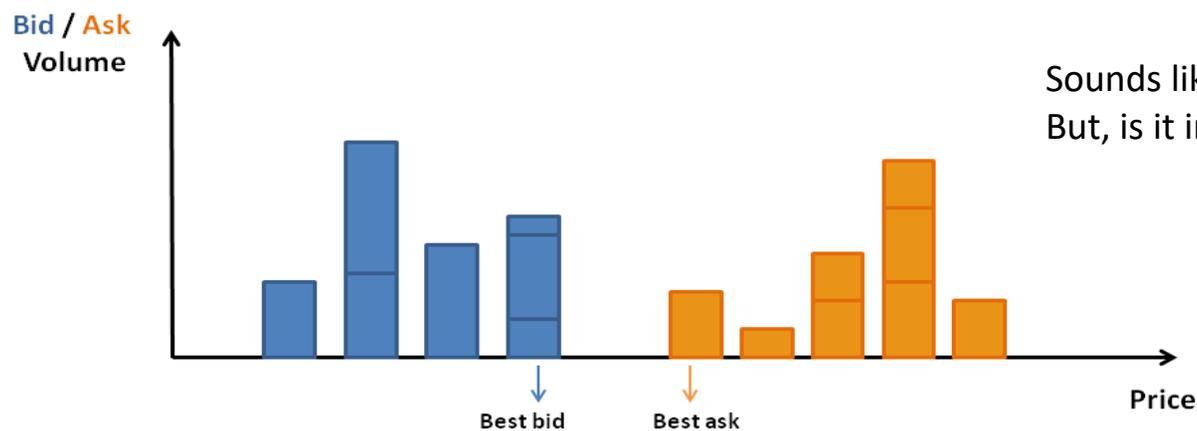


Sounds like a stat mech problem.  
But, is it in equilibrium state?

# My Experience – Valuation Research

## Why is it complicated?

- Price levels are discrete, people buy (“bid”) or sell (“ask”) at separated prices
- Supply and demand can change due to many different order types
- The same/similar instruments are available on different markets
- Market information now is not always the information you can act on.



Sounds like a stat mech problem.  
But, is it in equilibrium state?

# My Experience – Crypto Currency



Crypto currencies are traded globally on internet and listed exchanges

Cryptocurrencies ▾ Exchanges ▾ Watchlist USD ▾ Next 100 →

#	Name	Adj. Vol (24h)*	Volume (24h)	Volume (7d)	Volume (30d)	No. Markets	Change (24h)	Vol Graph (7d)	Launched
1	Binance	\$1,087,161,536	\$1,087,161,536	\$5,455,031,296	\$32,067,215,552	382	18.95%		Jul 2017
2	OKEx	\$859,436,788	\$859,436,788	\$4,703,519,488	\$25,806,818,304	507	7.81%		Jan 2014
3	Huobi	\$647,843,183	\$647,843,183	\$3,233,220,224	\$19,781,180,000	275	13.70%		Sep 2013
4	Bitfinex	\$494,920,779	\$494,920,779	\$2,276,803,456	\$13,685,419,120	82	12.68%		Oct 2012
5	ZB.COM	\$387,713,378	\$387,713,378	\$2,095,351,520	\$9,545,901,504	77	11.67%		Nov 2017
6	Bithumb	\$346,257,733	\$346,257,733	\$2,013,490,368	\$8,094,055,168	42	5.08%		Jun 2016
7	HitBTC	\$308,637,979	\$308,637,979	\$1,676,426,864	\$7,614,138,708	781	1.65%		Feb 2014
8	Bit-Z	\$223,509,175	\$223,509,175	\$1,185,152,784	\$4,597,485,080	147	17.49%		Jun 2016
9	Bibox	\$210,905,846	\$210,905,846	\$1,143,998,896	\$5,631,954,544	196	5.95%		Nov 2017
10	Coinsuper	\$209,885,148	\$237,282,107	\$1,156,846,080	\$5,530,937,704	55	25.96%		Feb 2018
11	BCEX	\$177,822,722	\$177,822,722	\$1,036,605,792	\$4,736,632,896	58	3.86%		Aug 2017



# My Experience – Crypto Currency



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Cryptocurrencies ▾ Exchanges ▾ Watchlist USD ▾ New 100

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## XBT-Cboe Bitcoin Futures



### Cboe XBT Bitcoin Futures Trading Data

Symbol	Expiration	Last	Change	High	Low	Settlement	Volume
CXBT	-	6470.88	+151.49	6529.99	6422.49	-	-
XBT/U8	09/19/2018	6470.00	+180.00	6520.00	6300.00	6290.00	1658
XBT/V8	10/17/2018	6465.00	+182.50	6510.00	6290.00	6282.50	191
XBT/X8	11/14/2018	6505.00	+220.00	6505.00	6325.00	6285.00	54
XBT/Z8	12/19/2018	6460.00	+190.00	6465.00	6295.00	6270.00	15

(DELAYED 10 MINUTES)

### The First U.S. Bitcoin Futures

Nov 2017

Feb 2018

Aug 2017



# My Experience – Crypto Currency



Crypto currencies are traded globally on internet and listed exchanges

- Emergent market:
  - New crypto coins can be created
  - New contracts are released more frequently

Pricing

## ETHUSD: Contract Specification

**ETH USD**

The base currency is ETH.

The quote currency is USD.

### Description

ETHUSD is a ETH/USD perpetual contract priced on the .BETH Index. Each contract is worth 0.001 mXBT per \$1 price, currently 0.00018336 XBT.

Funding is paid and received every 8 hours. The next payout event is at 3:00 PM CDT.

ETHUSD uses a Premium Index to calculate funding rates. The underlying interest rates are quoted in the .ETHBON8H Index and .USDBON8H Index, and the premium rate is quoted in the .ETHUSDPI8H Index. These are used to calculate the final funding rate.

Today, longs will pay 0.0100%, and shorts will receive 0.0100% at 3:00 PM CDT. BitMEX does not charge fees on funding payments.

**Expiry:** This instrument is perpetual and does not expire.

A quanto “future” with some tweak and twist!



# My Experience – Crypto Currency



Crypto currencies are traded globally on internet and listed exchanges

- Emergent market:
  - New crypto coins can be created
  - New contracts are released more frequently
- High risk:
  - Some internet exchanges are not regulated
  - Values of crypto coins are up to wild speculation

Pricing

Position  
management

Need to estimate short-term, high-frequency correlation between BTC and ETH.  
The following equation totally not going to work...

$$\Sigma = \mathbf{E} \left[ (X - \mathbf{E}[X]) (X - \mathbf{E}[X])^T \right]$$

# My Experience – Crypto Currency



Market	Price	Open 24H	Range 24H	Last trade	Volume 24H	Change 24H
<b>Bitfinex</b> Just now	\$ 6,486.50	\$ 6,275.70	L: \$ 6,268.53 H: \$ 6,528.40	B 0.01237 \$ 80.21	B 15,998.46 \$ 102,430,853.03	\$ 210.80 3.36%
<b>GDAX</b> Just now	\$ 6,484.22	\$ 6,262.00	L: \$ 6,252.77 H: \$ 6,530.00	B 0.04427 \$ 287.05	B 9,237.96 \$ 58,977,780.57	\$ 222.22 3.55%
<b>Simex</b> Just now	\$ 6,490.81	\$ 6,278.37	L: \$ 6,276.89 H: \$ 6,548.75	B 0.3976 \$ 2,580.72	B 9,000.07 \$ 57,387,586.59	\$ 212.43 3.38%
<b>Bitstamp</b> Just now	\$ 6,480.00	\$ 6,265.00	L: \$ 6,255.63 H: \$ 6,533.71	B 0.001836 \$ 11.90	B 5,354.22 \$ 34,296,088.75	\$ 215.00 3.43%
<b>Bitlish</b> 1 min ago	\$ 6,492.00	\$ 6,305.28	L: \$ 6,305.28 H: \$ 6,570.00	B 1.00 \$ 6,492.00	B 4,302.35 \$ 27,896,480.38	\$ 186.72 2.96%
<b>itBit</b> 1 min ago	\$ 6,487.31	\$ 6,264.65	L: \$ 6,254.59 H: \$ 6,530.01	B 0.003200 \$ 20.76	B 3,974.36 \$ 25,362,169.38	\$ 222.66 3.55%
<b>Kraken</b> Just now	\$ 6,493.00	\$ 6,262.00	L: \$ 6,256.60 H: \$ 6,529.00	B 0.07272 \$ 472.19	B 3,855.05 \$ 24,625,889.02	\$ 231.00 3.69%
<b>Gemini</b> Just now	\$ 6,484.86	\$ 6,262.61	L: \$ 6,258.52 H: \$ 6,529.99	B 0.0001804 \$ 1.17	B 2,155.99 \$ 13,776,658.08	\$ 222.25 3.55%

exchanges

- Numerous opportunities:
  - Same crypto coins on different exchanges
  - Crypto pairs, triangles, ... (BTC/USD, ETH/USD, ETH/BTC)

Signals



# Akuna's Quant Trading and Research team

Trading based on quantitative models and automatic strategies

- Quant Traders:
  - execution, observation, strategic thinking
- Quant Developers:
  - pricing, automation, system design
- Quant Researchers:
  - data analysis, signal discovery, formalizing models

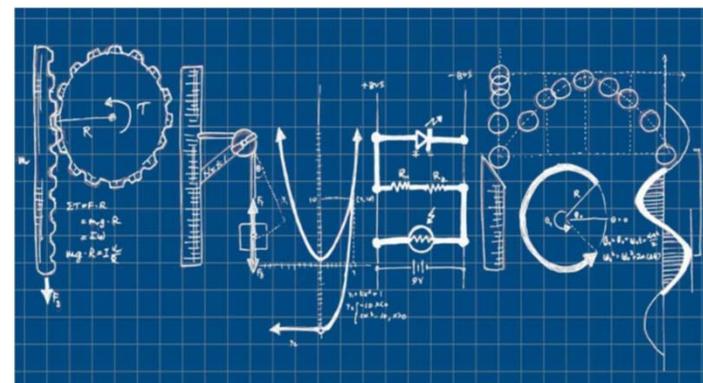


# Relevant skills for Quants

- Math skills:
  - Basics: Linear algebra, probability, differential equations ....
  - Statistics/Data Analysis
  - Stochastic calculus
- Programming skills (like C++/python):
  - Numerical methods/analysis
  - Algorithms
  - Data analysis/Machine learning
  - Parallel programming
- Plenty of great online resources/courses
- Take courses in other departments (CS, Statistics)

# Why Physics/Grad School?

- Great problem solving and analytical skills
- Solid math skills/background relevant to financial models
  - Coming up with approximations
  - Knowing the limitations of your models
- Used to reading papers and learning new topics quickly
- Ability to work independently
- Fresh ideas and creative solutions



# Why Akuna?

- Company culture: collaborative and innovative
- Great place to learn and contribute on the job (for someone from physics background)
- Still really young. More responsibility early. Willing to try new ideas.
- Chicago. Nice office in downtown.
- Lots of company events. Yearly company trips (Utah, New Orleans, Austin, Nashville)
- Also financially rewarding



## NOW HIRING

Apply online today at [www.akunacapital.com/careers](http://www.akunacapital.com/careers) and mention this talk for how you heard about Akuna!

Full Time Opportunities for recent grads:

- Junior Traders
- Junior Quantitative Traders
- Junior Quant Developers
- Junior Quant Researchers
- Junior Developers

Internship opportunities are also available!



The logo for akuna capital, featuring the word "akuna" in a lowercase sans-serif font, followed by a stylized blue wave icon, and then the word "capital" in a lowercase sans-serif font.

THE NEW WAVE  
IN TECH AND TRADING

[akunacapital.com](http://akunacapital.com)

QUESTIONS?

**XIONGJIE YU**

Junior Quantitative Researcher

If you have any follow-up questions, direct them to  
[recruiting@akunacapital.com](mailto:recruiting@akunacapital.com)