## The Web3 Ecosystem

Anthony Lee Zhang

November 4, 2024

## Overview

### **Crypto Exchanges**

- Competition in the Cryptocurrency Exchange Market, Junyi Hu and Anthony Lee Zhang
- Custody, fraud risks
- Fees
- Regulation

### Cedefi

Business model, risks

### Other players

- L1s
- Exchanges
- VCs
- Hedge funds
- Mutual funds, ETFs
- Protocols

## Institutional Background

- Crypto exchanges allow customers to buy/sell fiat for crypto
  - Customers "deposit" fiat through bank transfer; trade for crypto; withdraw crypto
  - Or vice versa!
- Reasons for trading crypto:
  - Storing value, while dodging capital controls, inflation, legal enforcement...
  - Participating in "decentralized finance"
  - Financial speculation

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- Reasons for trading crypto:
  - Storing value, while dodging capital controls, inflation, legal enforcement...
  - Participating in "decentralized finance"
  - Financial speculation
- Much larger role than exchanges for traditional assets!
  - Handle custody, onboarding/offboarding
  - Often vertically integrated with VC, applications (chains, stablecoins), derivatives & leverage...
  - Exchanges are the "universal banks" of crypto world



#### 8-31 -1 7 B) (B) Jump start your portfolio $\rightarrow$ ≡ Φ \$8.831.08 Jump start 8.31 6 **Duy Bitcoin** your crypto **\$10** .. portfolio One time purchase v Your assets Balance v \$7,381.13 Ditcoin Citi \$100.000.00 limit \$1,381,11 C Ethereum Coinbase is the easiest place to buy and sell 2 3 cryptocurrency. Sign up and get started today. Δ 5 6 (5) US Dollar \$100.92 7 8 9 anthonyzhang0@gmail.con Get started e ~ 0 80 0 ←

#	Name	Price	Change	Chart	Trade	



Q) News Huobi Will List POOLX (Poolz Finance) on March 30, 2023 03-29 More >



#### Market Trend



Grygries	23,000 Exchanger 584 Mariat Cap	\$100,000,000,000,000	10.10 \$45548,436,747 Dos	inance: BFC 46.35 ED	mys Reniese 256	-	Engl	w • 0 USD • 1	C 🔻 Login 🕞 Loging
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**	Exchange	Score 0	Trading volume(34%)	Avg.Liquidity	Weekly Visits 0	# Markets	# Coins	Fat Supported	Vokama Graph (76)
,	🔷 Binance 🚌		\$11,991,750,730 + 1,53N	110	14,012110	1679	385	EUR, OBP, BRL and 13 more 0	-
2	🕻 Coinbase Exchange 🙃	•	\$1,348,045,711 • 14.00N	719	38,248	588	243	USD, EUR, OBP	- mon
3	🔾 Kraken 🙊	19	\$899,504,854 _ 15.07N	752	1,023,976	709	224	USD; EUR, GEP and ~5 more D	· ~
4	K KuCoin 🕾		\$898,317,805 • 8.08N	583	2,096,017	5448	815	USD, AED, ARS and 145 more ID	· Mun
5	Dybit 🚌	•	\$887,545,681 + 1.55%	647	3,393,389	549	383	USD, EUR, GBP and +3 mark (0)	· show
•	X OKX B	•	\$1,659,646,032 • 0.56%	585	1,863,084	802	365	AED, ARS, AUG and ~63 more (0)	: show
	Bistamp	•	\$221,574,880 • 16.84%	592	299,296	165	74	USD, EUR, 08P	· ~
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12	📥 MEXC 👘	•	\$1,026,391,947	685	3,429,935	1826	1529		~1
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14	👎 bitFlyer	•	\$111,646,793	604	327,928	12	۰	USD, JPY, EUR	~~~~
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18	🚯 Dilget 🙃	62	\$711,572,026 + 0.49%	582	3,555,337	061	494	USD, EUR, GER and +12 mins (0)	5 show
12	å Hashi 🖏	•	\$533,227,197 • 0.05%	494	7,531,199	834	596	ALL, AUD, BRL and ~E7 more D	- Mun

The Market Structure of Crypto Exchanges

US has roughly 10 equity exchanges

# The Market Structure of Crypto Exchanges

- US has roughly 10 equity exchanges
- Over 1,000 crypto exchanges exist!
  - Mostly trading same assets
  - Serving different countries, but often many active within a country

# Market Shares of Large Exchanges



## Motivation

- Why is crypto exchange market structure so fragmented?
- If exchanges compete for an approximately fixed volume of trade, why don't big exchanges just absorb smaller ones?
- If exchange market structure is so competitive, do the big exchanges have much ability to shift market outcomes?

Expectation: large and small exchanges are substitutes

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- After large exchange entry, small exchanges less likely to enter

Finding: large and small exchanges are complements!

- ▶ Large exchange listings  $\rightarrow$  small incumbent volume increases!
- Small exchanges follow large exchange listings
- ► Large exchange listings → decreases in price dispersion across exchanges

# This paper: Model and Tests Model

- "Periphery" of small exchanges with captive customers bases
- Liquidity provided partially by arbitrage with deep core exchanges
- Core exchanges' listing leads to higher volumes and profits for smaller exchanges
- Model predictions validated empirically

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#### **Policy Implications**

- Small exchanges "costly windows" to big exchange liquidity
- Big exchanges play systemically important leader role!
- For each \$1 trading volume generated, \$0.60/ \$3.51 of volume increases on other exchanges

### Data

- OHLCV data from cryptotick.com
- Daily open-high-low-close price data, and volumes, for 264 exchanges and 12,417 coins
- Restrict to top 500 coins on Sept 3, 2022
- Listings identified through first time coin trades on an exchange
- Treat two largest exchanges at present, Binance and Coinbase, as "large"

When a large exchange lists a new token:

- "Incumbent" small exchanges which have already listed token experience increased trading volume
- Small exchanges which haven't listed have increased propensity to list
- Token price dispersion across small exchanges decreases

Listings and Trade Volumes: DID specs

Estimate DID specifications:

$$\log(\textit{Volume}_{c,e,t}) = \sum_{k=-11}^{11} \beta_k \times \textit{treat}_{c,k,t} + \delta_{c,e} + \eta_t + \epsilon_{c,e,t}$$

Treatment: listing by large exchange (Binance, Coinbase)
δ<sub>c,e</sub>: coin-exchange FE

•  $\eta_t$ : time FE

## Listings and Volumes



### Listings and Volumes

$$\begin{split} \log(\textit{Volume}_{c,e,t}) = & \beta_1 \textit{Listing} (0\text{-}30 \text{ days})_{c,t} + \beta_2 \textit{Listing} (\underset{i}{\wr} 30 \text{ days})_{c,t} + \\ & \beta_3 \textit{PreThreedayListing}_{c,t} + \delta_{c,e} + \eta_t + \varepsilon_{c,e,t} \end{split}$$

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Dependent Variables:				Log Dollari	zed Volume			
		Bin	ance			Coir	ibase	
Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Listing (0-30 days)	1.5***	0.68***	0.45***	0.25***	0.96***	0.96***	0.78***	0.69***
	(0.11)	(0.09)	(0.08)	(0.07)	(0.07)	(0.06)	(0.05)	(0.05)
Listing (¿ 30 days)	0.79***	0.19**	0.05	0.02	0.45***	0.58***	0.56***	0.56***
	(0.12)	(0.10)	(0.08)	(0.08)	(0.09)	(0.07)	(0.06)	(0.06)
Pre Three-day Listing	0.86***	0.55***	0.48***	0.32***	1.0***	1.0***	1.0***	0.92***
	(0.11)	(0.09)	(0.08)	(0.07)	(0.07)	(0.06)	(0.05)	(0.05)
Coin FE	Yes	Yes	Yes	No	Yes	Yes	Yes	No
Day FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	No	Yes	No	No	No	Yes	No	No
Exchange FE	No	No	Yes	No	No	No	Yes	No
Coin-Exchange Pair FE	No	No	No	Yes	No	No	No	Yes
Adjusted R <sup>2</sup>	0.20	0.39	0.61	0.79	0.20	0.39	0.62	0.79
Observations	5,959,024	5,799,025	5,959,024	5,959,024	5,959,024	5,799,025	5,959,024	5,959,024

# Listing Following: Graphical Evidence



# Listing Following: Poisson DID

Coin-time level specification:

$$\#\textit{Exchanges}_{c,t} = \sum_{k=-11}^{11} \beta_k \times \textit{treat}_{c,k,t} + \delta_c + \eta_t + \varepsilon_{c,t}$$



### Listing Following: Poisson DID

$$\begin{split} \# \textit{Exchanges}_{c,t} = & \beta_1 \textit{Listing} \, (0\text{-}30 \text{ days})_{c,t} + \beta_2 \textit{Listing} \, (\substack{i \\ 0 \text{ days}})_{c,t} + \\ & \beta_3 \textit{PreThreedayListing}_{c,t} + \delta_c + \eta_t + \varepsilon_{c,t} \end{split}$$

Dependent Variables:	Net Listings			
	Binance	Coinbase		
Model:	(1)	(2)		
Listing (0-30 days)	0.11*** (0.009)	0.12*** (0.01)		
Listing (¿ 30 days)	0.01*** (0.003)	0.01*** (0.004)		
Pre Three-day Listing	0.04**´ (0.02)	0.04** (0.02)		
Coin FE Day FE Adjusted R <sup>2</sup>	Yes Yes 0.10	Yes Yes 0.11		
Observations	537,583	532,604		

# Listings and Price Dispersion: Graphical Evidence



### Listings and Price Dispersion: Graphical Evidence

Coin-time level specification:

$$\textit{Dispersion}_{c,t} = \sum_{k=-11}^{11} \beta_k \times \textit{treat}_{c,k,t} + \delta_c + \eta_t + \varepsilon_{c,t}$$



### Listings and Price Dispersion

$$\begin{split} \textit{Dispersion}_{c,t} = & \beta_1 \textit{Listing} \, (0\text{-}30 \text{ days})_{c,t} + & \beta_2 \textit{Listing} \, (\substack{i \\ i \\ 0 \text{ days}})_{c,t} + \\ & \beta_3 \textit{PreThreedayListing}_{c,t} + & \delta_c + & \eta_t + & \varepsilon_{c,t} \end{split}$$

Dependent Variables:	Dispersion			
	Binance	Coinbase (2)		
Model:	(1)			
Listing (0-30 days)	-0.02**	-0.007		
	(0.01)	(0.007)		
Listing (¿ 30 days)	-0.03***	-0.01		
/	(0.01)	(0.009)		
Pre Three-day Listing	-0.006	0.003		
	(0.01)	(0.008)		
Coin FE	Yes	Yes		
Day FE	Yes	Yes		
Adjusted R <sup>2</sup>	0.46	0.46		
Observations	427,388	427,388		

# Model Setup

Single risky asset ("token"). Four kinds of agents:

- 1. Central exchanges: Infinitely deep markets for token
- 2. **Peripheral exchanges:** Finitely deep markets with captive customer base, make money from trade volume
- 3. **Customers:** Trade on peripheral exchanges due to liquidity shocks
- 4. **Arbitrageurs:** Arbitrage price deviations between peripheral and central exchange, subject to inventory costs

# Model Illustration: Inventory Shock

- Negative inventory shock on peripheral exchange
- More demand than supply at the efficient price P<sup>cen</sup>



# Model Illustration: Without Central Exchange

▶ Without central exchange,  $P^{per} > P^{cen}$ 



# Model Illustration: With Central Exchange

• With central exchange,  $P^{per} \approx P^{cen}$ 



# Conclusions

Crypto exchanges are complements, not substitutes!

Large central exchanges' entry increases small exchange volume

Small exchanges have incentive to follow large exchanges

- Policy implications:
  - Small exchanges essentially a "costly window" to large exchange liquidity: would users benefit from centralization?
  - Large exchanges have unilateral, unregulated power to shift market outcomes: regulators may want to monitor
On one hand, projects have very compelling arguments to get listed on a CEX:

- Retail access. A project can expand its reach via CEX listing by capturing a large user base outside of DeFi. As an example, high tier exchanges have tens of thousands of participants in their different types of launches (launchpads, token farming, etc.).
- Overall brand awareness. Associating your name to that of Binance or Coinbase, and leveraging their marketing, is also believed to be a big plus, as niche projects might lack proper amplification channels for their product before launching on a CEX.
- More attention from VCs. It is often believed that, if a project scores a CEX listing, it'd be easier to raise more money before the listing happens.

#### Source 1, sorry for the slightly crass title, and Source 2

On the other hand, there is a full industry gravitating around token listing:

- The CEXs themselves. I would have thought their business was straightforward, making money from transaction fees. It is more subtle, I will get back to this later.
- The market makers (MMs). If projects do not list, there are no tokens to trade and no money to be made. My email, Twitter and Telegram are filled with enquiries from those lovely people. Don't get me wrong, I believe MMs are needed to keep markets efficient through arbitraging. And some are truly helpful, but most of them see you as a pot of money without much to offer back.
- The early bag holders. The team and the VCs may sell a portion of their holdings after their cliff. The higher the liquidity, the better it is to avoid impacting the market significantly.

Most of the stakeholders mentioned above have a STRONG interest in having you listed. Hence, almost constantly, all of them will tell you "you HAVE to list". Why? The main FOMO argument has always been "if you do not list at TGE then it gets extremely hard to get listed later. You will need to justify tens of millions of daily trading volume". Another argument has been "This is where the liquidity is".

#### Source 1, sorry for the slightly crass title, and Source 2

#### Les CEXs

Where should TANGO get listed? On Binance and Coinbase, obviously. But I wasn't really sure what to think of the other exchanges. Below is my table after my CEX journey in the first half of 2024. This table is my own. It is certainly not based on quantitative measures. Feel free to DYOR.



Source 1, sorry for the slightly crass title, and Source 2

CEX identified. How to get listed? I have identified 3 options:

- Go on their websites. Fill their form. This is chronophagous. Extremely chronophagous. Unbelievably chronophagous. The biggest loser move you can make. It literally leads to nothing. Not even a simple rejection email.
- 2. Go through your favorite MMs. The top ones are connected to all CEXs. But, even going through the biggest MMs does not ensure you get an introduction. To my surprise, less known MMs managed to get us introduced to Tier 2 CEXs. Then you have two possibilities: the MM introduces you and you negotiate directly with the CEX, or the MM comes directly with a deal that they pre-negotiated with the CEX. We experienced both scenarios.
- Get connected to the CEX business developers. Or higher ranked people. Go through your favorite VC. Your contacts. Go to conferences. Or whatever you need to do to get connected. This also worked.

#### Source 1, sorry for the slightly crass title, and Source 2

#### Then comes the fees.

I knew about the listing fees. And about the marketing fees too. We got offers to list on Tier 2, 3, and 4 CEXs. On Tier 2 CEXs we saw deals (listing + marketing fees) ranging from \$100k to \$400k\$. Tier 4 deals were under 100k\$. You usually have to pay 50% in USD stables and 50% in your project tokens. If you want an idea of Tier 1 listing, check Arthur Hayes' <u>article</u>.

What I did not know about was the deposit fee. Two of our CEX proposals had this "extra" fee. One of them totally blew my mind: on top of the listing and marketing fees, we were asked to make a deposit of FIVE HUNDRED THOUSANDS UNITED STATES DOLLARS. We could get it back if, after 2 weeks, the token does at least a 5x compared to the listing price. If we do not do a 5x then a penalty schedule kicks in. Right... This scheme is engineered to make sure there is no sell pressure when the token gets listed. I.e. no airdrops and no allocations released at TGE. Why? If I have to guess, this is because CEXs get a lot of pressure for their token to perform well after listing.

To make it even more fun, note that some CEXs asked us to use their launchpad at ridiculously low valuation against a small supply amount. This is to ensure that early users, selected through a lottery scheme, have a bigger chance to make profits. Then the CEX can go scream everywhere that the gems they listed had a great return.

If anyone thought CEXs are there to bring you users, it looks like they are making projects bear all the risks... Should we really be at the mercy of CEX schemes to bring liquidity to the project tokens? Is there an alternative way instead of paying \$1M+ in CEX listings?

#### Course 1 course for the elimetry once that and Course 0

There are three main ways CEXs extract money from projects.

- 1. They charge an outright listing fee.
- 2. They require a deposit, that is returned if the project delists.
- They mandate a specific amount of on-platform project-financed marketing spend.

In general, every CEX's listing team grades projects. The shittier your project, the higher the fee. As I always tell founders, if your project has few users then you need a CEX to dump your dog shit on the market. If your project has a product market fit and a healthy growing ecosystem of real users, you don't need a CEX because your community will support your token price wherever it is listed.

#### Listing Fee

At the top end, Binance charges up to 8% of the total token supply as a listing fee. Most other CEXs charge between \$250,000 and \$500,000, paid in stablecoins.

#### Deposit

Binance devised a genius strategy for requiring projects to purchase BNB and stake it as a deposit. When / if the project delists, the BNB is returned. Binance requires up to \$5,000,000 worth of BNB to be purchased and staked as a deposit. Most other CEXs require a deposit of \$250,000 to \$500,000 in stables or that CEX's token.

#### Source 1, sorry for the slightly crass title, and Source 2

#### Marketing

Binance at the top end requires the projects to give away 8% of their token supply to Binance users via on-platform airdrops and other campaigns. The medium-expensive CEXs require a spending of up to 3% of the token supply. At the bottom end, CEXs require a marketing spend of \$250,000 to \$1 million paid in stables or project tokens.

Added together, getting listed on Binance could cost 16% of your token supply and a \$5 million purchase of BNB. If Binance isn't the primary exchange, a project will still face spending of almost \$2 million worth of tokens or stablecoins.

For any CEX who challenges these numbers, I implore you to provide a transparent accounting of every single cost or mandated spend that your exchange requires to list a new token. I received these numbers from several projects that have evaluated the costs of all the major CEXs. The data may be out of date. I will reiterate that I believe the CEXs are doing nothing wrong. They have a valuable distribution channel and are maximising its value. My gripe is that the post-launch token performance isn't sufficient to warrant project founders paying these fees.

#### Source 1, sorry for the slightly crass title, and Source 2

### Exchanges

- Role of exchanges in tradfi relatively minor: can't really tell what exchange you're trading on
- Crypto exchanges play a much larger role!
  - Asset selection
  - Crypto on-off ramps
- Much more vertically integrated than tradfi exchanges
- Also, more competition from DEXes

## Crypto and Capital Flight

Decrypting New Age International Capital Flows, Clemens Graf von Luckner, Carmen M. Reinhart, Kenneth Rogoff:

- Analyze data from Paxful and LocalBitcoins, peer-to-peer crypto exchanges, observe many trades close in time like:
  - 0.03842 BTC purchased for Argentine pesos
  - 0.03842 BTC sold for USD

What is going on?

<sup>&</sup>lt;sup>1</sup>Not legal or trading advice...

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- Analyze data from Paxful and LocalBitcoins, peer-to-peer crypto exchanges, observe many trades close in time like:
  - 0.03842 BTC purchased for Argentine pesos
  - 0.03842 BTC sold for USD
- What is going on?
- Argentine citizen has essentially traded pesos for USDs without doing a bank wire!<sup>1</sup>
- Hence, exchanges in many countries face strict KYC/AML requirements: where is the \$\$ coming from?

<sup>&</sup>lt;sup>1</sup>Not legal or trading advice...

### Trust

Crypto held in a wallet:

- Transparent
- Self-custodied: essentially un-stealable
- Access at will, cond. blockchain operational

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Exchanges are functionally  $\underline{asset\ custodians}$ , exposing users to counterparty risk

#### Hacks



#### Mt. Gox Seeks Bankruptcy After \$480 Million Bitcoin Loss

By Carter Dougherty and Grace Huang

February 28, 2014 at 1:25 PM CST Updated on February 28, 2014 at 1:59 PM CST

Save

This article is for subscribers only.

Mt. Gox, once the world's largest Bitcoin exchange, filed for bankruptcy in Japan saying about \$480 million in Bitcoins belonging to its customers and the firm were missing.

"The company believes there is a high possibility that the Bitcoins were stolen," Mt. Gox said in a statement.

The filing follows three weeks of speculation about the fate of the Tokyo-based exchange, which suspended withdrawals on Feb. 7. Since Bitcoins exist as bits of software, they can be stolen if a hacker gains access to the computers and servers used to run online exchanges, where the virtual currency can be traded for dollars, euros and other currencies.

### Hacks

On Monday night, a number of leading Bitcoin companies jointly announced that Mt. Gox, the largest exchange for most of Bitcoin's existence, was planning to file for bankruptcy after months of technological problems and what appeared to have been a major theft. A document circulating widely in the Bitcoin world said the company had lost 744,000 Bitcoins in a theft that had gone unnoticed for years. That would be about 6 percent of the 12.4 million Bitcoins in circulation.

#### Hacks

Security

# Binance says more than \$40 million in bitcoin stolen in 'large scale' hack

Zack Whittaker, Catherine Shu / 8:10 PM CDT • May 7, 2019

Comment



# Bitcoin Plunges After Hacking of Exchange in Hong Kong



A shop in Hong Kong that accepts the digital currency Bitcoin. Bitfinex, a Bitcoin exchange based in the city, said that any outstanding settlements would be made at the price before it reported the hacking. Philippe Lopez/Agence France-Presse — Getty Images

#### By Amie Tsang

United States

# Buried gold, burning trash: US couple admits to hiding hacked crypto



[1/2] Photo illustration of Bitfinex cryptocurrency exchange website taken September 27, 2017. Picture taken September 27, 2017. REUTERS/Dado Ruvic/Illustration Purchase Licensing Rights [7]

WASHINCTON, Aug 3 (Reuters) - A husband-and-wife duo on Thursday pleaded guilty to laundering money stolen in a 2016 hack of cryptocurrency exchange Bitfinex through an elaborate scheme involving burying optic onis and burning documents in a trash can in Kazakhstan.

In a hearing before U.S. District Judge Colleem Kollar-Kotelly in Washington, Moscow-born U.S. citizen ilya Lichtenstein admilited to hacking the exchange and enlisting his wife, an online rapper named Heather Morgan who has gone by the alias "Razzlekhan," to help conceal some 119,754 stolen bitcoin.

>

# FTX...

"Margin trading":

- I deposit \$100 USD, FTX lets me buy \$500USD of BTC, using other customers' funds
- ▶ If BTC value falls below \$450USD, BTC is auto-sold
- Effectively, borrowing \$400USD from other customers, "secured" by BTC

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Alameda margin trading:

- FTX founders had a hedge fund, with an account on FTX
- Could in principle "margin trade"
- However, more or less could "borrow" as much as they wanted, with no liquidation of collateral
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Result:

When customers wanted to withdraw, assets were already lost by Alameda

Note: all content above are my summary and understanding based on public news and should not be interpreted as constituting legal advice or opinions

### FTX: lessons

With a centralized exchange:

- Legally, exchange holds funds on your behalf and doesn't do anything with them
- Practically, they're holding a bunch of stuff, and practically they can take it out however/whenever they want
- Highly risky scenario...

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### A Blast from the Past

I wrote end-2022:

- Anecdotally, vertical integration more common in crypto
- FTX has a venture group, founders also run a prop trading firm, Alameda Research
- Bitfinex exchange, and stablecoin issuer Tether, co-owned
- Binance has a venture arm, a chain, and a USD stablecoin
- Possible conflicts of interest?

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- FTX has a venture group, founders also run a prop trading firm, Alameda Research
- Bitfinex exchange, and stablecoin issuer Tether, co-owned
- Binance has a venture arm, a chain, and a USD stablecoin
- Possible conflicts of interest?

2024: Iol

Lin William Cong, Xi Li, Ke Tang, Yang Yang

#### Benford's law

Article Talk

From Wikipedia, the free encyclopedia

Not to be confused with the unrelated adage Benford's law of controversy.

Benford's law, also known as the Newcomb–Benford law, the law of anomalous numbers, or the first-digit law, is an observation that in many real-life sets of numerical data, the leading digit is likely to be small.<sup>[1]</sup> In sets that obey the law, the number 1 appears as the leading significant digit about 30% of the time, while 9 appears as the leading significant digit less than 5% of the time. If the digits were distributed uniformly, they would each occur about 11.1% of the time.<sup>[2]</sup> Benford's law also makes predictions about the distribution of second digits, third digits, digit combinations, and so on.

Lin William Cong, Xi Li, Ke Tang, Yang Yang



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#### Figure 1 First-significant-digit Distribution and Benford's Law

Figure 1 displays the first-significant-digit distributions of trading data in bar charts. Black dots represent distributions derived from Benford's law. R2, UT6, U8, U9, and U14 are five exchanges selected from regulated exchanges, Tier-1 unregulated and Tier-2 unregulated exchanges, respectively.









#### Lin William Cong, Xi Li, Ke Tang, Yang Yang







Lin William Cong, Xi Li, Ke Tang, Yang Yang

Crypto Wash Trading Lin William Cong, Xi Li, Ke Tang, and Yang Yang NBER Working Paper No. 30783 December 2022 JEL No. G18,G23,G29

#### **ABSTRACT**

We introduce systematic tests exploiting robust statistical and behavioral patterns in trading to detect fake transactions on 29 cryptocurrency exchanges. Regulated exchanges feature patterns consistently observed in financial markets and nature; abnormal first-significant-digit distributions, size rounding, and transaction tail distributions on unregulated exchanges reveal rampant manipulations unlikely driven by strategy or exchange heterogeneity. We quantify the wash trading on each unregulated exchange, which averaged over 70% of the reported volume. We further document how these fabricated volumes (trillions of dollars annually) improve exchange ranking, temporarily distort prices, and relate to exchange characteristics (e.g., age and userbase), market conditions, and regulation.

# Policy Questions: Exchange Regulation

- How should we regulate exchanges?
- Should joining trading and custody be allowed?
- Accounting frameworks?



- By tradfi standards, consumer-facing crypto exchange fees were extraordinarily high!
- Coinbase fees (lower than before): 0.5%! (On top of bid-ask spreads!)
- Traditional exchanges charge ~0% for equity trades, bid-ask spreads for liquid equities ~10bps

# **CEX-DEX** competition

- Purely for trading assets, exchanges face competition from decentralized exchanges
- (3 links) Some sources suggest DEX liquidity is now competitive with CEX liquidity, in terms of fees! Though, this is controversial
- However, DEXes can't do fiat on/off ramp
- Why else would you use a DEX instead of a CEX?

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- However, DEXes can't do fiat on/off ramp
- Why else would you use a DEX instead of a CEX? The "decentralization" benefits of crypto...







Businesses Community Media About Care

# 1.7 million people call Celsius their home for crypto

Individuals

Because we put our community first. Join us for military-grade security, next-level transparency, and a do-it-all app designed to help you reach your financial goals — whether you're HODLing long-term or swapping daily.

Enter your email

Get Started

By entering your ennal, you agree to our <u>Terms of Service</u> + <u>Privacy</u> Palcy, including receipt of ennals. You can unsubscribe at any time. All retail loans are issued by Celsius Lending, LLC



### Cedefi...


Celsius Network Inc.	
Consolidated Assets & Liabilities, as of July 13, 2022	
(USD, MMs)	
Liabilities	
User Liabilities	\$ (4,720)
CEL Liabilities	(210)
Custody Liabilities	(180)
Other	(390)
Total Liabilities	\$ (5,500)
Assets	
Bank Cash	170
Crypto Assets	1,750
Loans	930
Allowance For Doubtful Accounts	(310)
Net Loans	620
Mining Assets	720
Custody Assets	180
CEL Token	600
Other	270
Total Assets	\$ 4,310
Surplus / (Deficit)	\$ (1,190)

Note These preliminary unaudited amounts are presented on a non-GAAP basis for illustrative purposes only and are rounded to the nearest \$10 million USD. Amounts include non-Debtor subsidiaries. Celsius generally does not produce mid-month balances sheets, and the intent here is to provide a snapshot and directional sense for various assets and liabilities as of the petition date. Amounts from subsequent filings reflecting a petition date balance sheet may be materially different as a result of further review and diligence by management.

Liabilities:

- Retail can buy/trade/ "deposit" crypto, average ~5% APY,
- Celsius had 600,000 depositors \$4.2bil of assets

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- \$930mil of loans, only 47 institutional borrowers, \$98.5mil of collateral
- Leveraged: \$648mil in borrowing!
- Few hundred mil deployed in various "prop trading" strats: market making, basis trade, stat arb strategies...

Allegedly, delegated to other investors as well

- Staking: lock ETH up, waiting for POS: 5% APY, but illiquid
- \$720mil mining assets

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What happened?

- Experienced a run: most of these strats can't be liquidated quickly
- Markets can stay illiquid longer than you can remain solvent!

## Many Strategies, Many Risks: Op Risk

93. Celsius suffered other unanticipated losses to the business. For example, in June 2021, StakeHound, an Eth2 staking service provider, announced that it had misplaced the "keys" to over 38,000 Ethereum tokens, including 35,000 of the Company's Ether, due to an alleged error

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by StakeHound's third-party crypto custody provider Fireblocks. StakeHound is currently engaged in legal proceedings with Fireblocks.

## Many Strategies, Many Risks: Counterparty Risk

94. Moreover, to support its operations, from October 2019 to February 2021, due to the lack of institutional lending available to cryptocurrency companies, the Company took out collateralized term-loans from a private lending platform. In July 2021, when Celsius attempted to repay one of its loans, it was informed for the first time that the lender was unable to return the Company's collateral on a timely basis, resulting in Celsius having an approximately \$509 million uncollateralized claim against this party after it setoff its own loan obligations to the lender. Since September 2021, the lender has made regular principal payments to the Company, and continues to make timely payments that are currently in excess of \$5 million per month. The aggregate principal owed to the Company stands at approximately \$439 million, consisting of \$361 million in USD and 3,765 BTC, the latter worth approximately \$78 million.

## Many Strategies, Many Risks: Liquidity Risk

122. Moreover, as discussed in Part II of this Declaration, as a part of its asset deployment business model, a number of Celsius' assets were tied up in illiquid investments, including stETH and the CNL loan to Mining, that were intended to generate profit over time. While under normal market conditions Celsius had enough liquidity to support 100 percent of customers withdrawals, with the ability to support up to 70 percent of those withdrawals over a seven day period, the combination of the decline in crypto prices and uptick of user withdrawals from Celsius' platform and the need to post additional collateral left Celsius struggling to deal with two competing demands on its liquid assets: Celsius could either process user withdrawals or transfer additional collateral to DeFi protocols to support its already existing loans and avoid liquidation of its collateral and subsequent additional losses.

## Many Strategies, Many Risks: Run Risk

#### d. Misleading Media Coverage

117. As Celsius attempted to weather the "cryptopocalypse" storm, it began to receive increased negative media attention—a number of such stories were false and misleading. Immediately after the Luna collapse, social media spread misinformation regarding a commitment by Celsius and others to a possible Luna bailout, followed by statements that Celsius had lost hundreds of millions of dollars on Luna. These rumors made users wary of Celsius' platform and contributed to accelerated withdrawals of over \$1 billion from the platform over five days in May 2022 at a time when distrust of cryptocurrency was at an all-time high.

## Numbers: Voyager

Retail: brokerage, "deposit-like" zero-maturity custody (12% interest!), loyalty token, payment cards, "staking" (CD's)...

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	Assets:
--	---------

Loan Counterparty	Borrowing Rates	Amount Outstanding (in thousands)
Alameda Research Ltd.	1% - 11.5%	\$376,784
Three Arrows Capital	3% - 10%	\$654,195
Genesis Global Capital, LLC	4% - 13.5%	\$17,556
Wintermute Trading Ltd	1% - 14%	\$27,342
Galaxy Digital LLC	1% - 30%	\$34,427
Tai Mo Shan Limited	10%	\$13,770
Other	4% - 8%	\$751
Total Loan Obligations		\$1,124,825

Source: Voyager Bankruptcy Filing

## (The Conspicuous Absence of) Collateral...?

55. In March 2022, the Company entered into a master loan agreement with 3AC (the "<u>3AC Loan</u>"). Pursuant to the 3AC Loan, the Company agreed to lend 15,250 Bitcoins and 350 million USDC to 3AC. The 3AC Loan was callable at any time by the Company. 3AC fully drew down on the 15,250 Bitcoins and 350 million USDC.

 After the Luna crash in 2022, the Company began to assess 3AC's downside exposure and the likelihood of repayment under the 3AC Loan. The Company made an initial

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request for a repayment by 3AC of \$25 million of USDC by June 24, 2022, and subsequently requested repayment of the entire outstanding balance of Bitcoin and USDC by June 27, 2022. 3AC did not repay either requested amount. Accordingly, on June 27, 2022, Voyager issued a notice of default to 3AC for failure to make the required payments under the 3AC Loan.<sup>7</sup>

Source: Voyager Bankruptcy Filing

## Growth Hacking and Decentralized Finance

- Here, I discuss CeDefi as "growth hacking gone wrong"
- In finance, easy to get very big, very fast! Just promise 10% returns on everything!
- But, how are you going to actually pay this back?
- Motive for regulation: competition leads potentially to excess risk-taking, consumers can't really tell quality, and financial institutions lose other people's money
  - Fun fact: bank deposit interest rates used to have a hard cap under Regulation Q
  - See also Drechsler, Savov, Schnabl

A few protocols with billions TVL:

- Maker (stablecoins)
- Uniswap (DEX)
- Curve, Convex (stablecoin DEX, incentive platform)
- Compound, Aave (lending, borrowing)

## The Big Protocols

- Interesting industrial organization: hybrid of open-source, but with money
- Nominally decentralized: control of code changes through token voting
- In practice, however, ownership fairly concentrated, voting even more so
- See here on a recent governance fight in Maker

## The Big Protocols

- Funds from fees collected, VC investments, token sales, "seigniorage"
  - We discussed emissions as a source of revenues
- Big protocols have full-time employees, and grant funds supporting development

## What do the protocols do?

My view: much of defi is essentially a leverage machine

- Maker: deposit ETH, get DAI, buy more ETH
- Aave, Compound: deposit ETH, borrow USDC, buy more ETH
- Uniswap: use DAI to buy more ETH

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- Defi splits a moderately risky asset (ETH) into a very risky asset (levered ETH) and a less risky asset (ETH-backed fixed income)
- Are we happy about this outcome?

## **Smaller Protocols**

- Very, very large set of smaller protocols: token, piece of code, etc.
- Very easy to launch! Fork public code, add some branding, add a token...
- Lightweight, low entry costs => pure "protocol" firms have surprisingly small team size

Large proliferation of blockchains:

- BTC
- Ethereum
- Solana, Avalanche, Luna, Cosmos, Sui, Aptos...

► ETH L2's: Optimism, Arbitrum, Starknet, zkSync... Besides BTC/ETH, most are fairly centralized (ownership, governance, development)

## L1 Ecosystems

- L1's solve a platform problem:
  - L1 is valuable if it has an active userbase/ecosystem
  - Users/builders want to build on L1's which already have a lot of activity
- Hence, L1's invest (often through printed tokens) in incentivizing development on their platforms
- "Ecosystem funds" / "foundations" to support app development (Solana, Terra, Avalanche)
- Events, hacker houses, etc.
- Somewhat less support for ETH, but has large first-mover advantage



### Global venture capital investment in cryptocurrency and blockchain companies

Global venture capital investment in cryptocurrency and blockchain companies as of late November 2021 [-] PITCHBOOK, NEW YORK TIMES

- Traditionally, VC investments very illiquid
- However, crypto protocols have tokens much more liquid than startup equity!
- ⇒ concerns that VCs publicize, then quickly sell tokens, "dumping on retail"
- Solution mechanisms:
  - Time-locked grants
  - Reputation

# Hedge funds, etc.

- Lots of hedge funds/prop trading/etc. Various strategies/time horizons, such as:
  - "Risk Factor" strategies (momentum, stat arb, news, events, etc.)
  - "Arbitrages" (Futures/spot basis trades, interest rate arbitrage, etc.)
  - Market making
  - On chain vs off-chain
- In early days (2019-2020 ish), surprising amounts of inefficiencies
  - Kimchi premium: BTC worth more in Korea than USA
  - Perp-spot basis trades returned well over 10%!
- Now, many big trading firms have crypto divisions, appears to be less low-hanging fruit
- Hedge funds have systematic <u>leverage demand</u>: where does leverage come from?

# Statement on the Approval of Spot Bitcoin Exchange-Traded Products



**Chair Gary Gensler** 

Jan. 10, 2024

Souce: SEC

## ETFs

Today, the Commission approved the listing and trading of a number of spot bitcoin exchangetraded product (ETP) shares.

I have often said that the Commission acts within the law and how the courts interpret the law. Beginning under Chair Jay Clayton in 2018 and through March 2023, the Commission disapproved more than 20 exchange rule filings for spot bitcoin ETPs. One of those filings, made by Grayscale, contemplated the conversion of the Grayscale Bitcoin Trust into an ETP.

We are now faced with a new set of filings similar to those we have disapproved in the past. Circumstances, however, have changed. The U.S. Court of Appeals for the District of Columbia held that the Commission failed to adequately explain its reasoning in disapproving the listing and trading of Grayscale's proposed ETP (the Grayscale Order).[1] The court therefore vacated the Grayscale Order and remanded the matter to the Commission. Based on these circumstances and those discussed more fully in the approval order, I feel the most sustainable path forward is to approve the listing and trading of these spot bitcoin ETP shares.

Souce: SEC

Though we're merit neutral, I'd note that the underlying assets in the metals ETPs have consumer and industrial uses, while in contrast bitcoin is primarily a speculative, volatile asset that's also used for illicit activity including ransomware,[4] money laundering,[5] sanction evasion,[6] and terrorist financing.[7]

While we approved the listing and trading of certain spot bitcoin ETP shares today, we did not approve or endorse bitcoin. Investors should remain cautious about the myriad risks associated with bitcoin and products whose value is tied to crypto.[8]

Souce: SEC

## Analytics

Web3 boom has spawned large demand for data, data processing, analytics

- Basic data: Etherscan
- Dashboarding, analytics: Dune, The Graph, Nansen
- Crypto price data providers: Tardis, Kaiko, CryptoTick, many others

Price feeds also freely available from many exchanges' websites

 (IMO) data is still annoying to work with, but situation is improving quickly

- Legal: Web3 also created large demand for legal services around web3, many firms
- Audit/security: Code is security audited, demand for audit services, "white hat hacker" services also exist
- Risk Modelling: See Gauntlet
- Marketing, community organization, etc.