Exchange Benchmark Report

July 2020

CryptoCompare Research
research@cryptocompare.com

In partnership with GDF

Mission Statement

Our Exchange Benchmark was established in 2019 as a tool to bring clarity to the cryptoasset exchange sector by providing a **framework for assessing risk**, bringing **transparency** and **accountability** to a complex and rapidly evolving market. It has since become an industry standard for evaluating exchanges. Our methodology has expanded and is now approached in several dimensions using a comprehensive data set, covering more than 165 exchanges across 8 categories of evaluation:

- Legal/Regulation
- KYC/Transaction Risk
- Data Provision
- Security
- Team/Exchange
- Asset Quality/Diversity
- Market Quality
- Negative Events Penalty

We adopt an innovative ranking methodology that utilises a combination of **qualitative** and **quantitative** metrics. We assign a grade to each exchange which helps **identify the lowest risk** exchanges in the industry. The Benchmark is backed by thousands of research hours and covers 68 qualitative and quantitative metrics.

What do the grades mean?

The Exchange Benchmark ranks exchanges from AA-E. We classify a **Top-Tier** exchange as any in the **AA-B** bracket and **Lower-Tier** exchanges as those graded **C-E.** Exchanges in the Top-Tier meet our minimum threshold for acceptable risk.

What the grading is not

This grading **does not connote overall superiority**, rather represents a means of ranking exchanges according to **risk.** The Exchange Benchmark does not serve as a guide to which platform is superior for trading, nor the reliability of reported volumes.

Who is the Benchmark for?

Exchanges looking to conduct more thorough competitor analysis, understand industry trends and areas for competitive parity.

Funds looking to assess counterparty risk and opportunities in digital asset markets.

Exchange service providers such as insurers, custodians and compliance services who want to gain a better understanding of the industry and identify potential customers.

Regulators who are looking to develop policy, or better understand the global digital asset landscape.

Investors and Traders who want to identify the least risky venues for trading.

Get the Benchmark scores using our API

Find out More About Custom Data

Contents

Key Highlights

Key Highlights

Lowest Risk Exchanges

Gemini, the US-regulated exchange, takes the number one spot. It is followed by Coinbase and Kraken in 2nd and 3rd position respectively.

Top-Tier Volumes

Lower-Tier exchanges (grades C-E) have continued to lose market share to Top-Tier exchanges (grades AA-B) quarter on quarter.

Following the latest Benchmark update, Top-Tier exchanges (grades AA-B) accounted for 32% of global volumes in Q4 2019. In 2020, they accounted for 36% in Q1 and 40% in Q2. Lower-Tier exchanges (grades C-E) accounted for 68%, 63% and 60% in the last three quarters respectively. In June, Top-Tier exchanges accounted for 46% of global volume while Lower-Tier exchanges accounted for 54%.

Security

Only 15% of exchanges state that they hold more than 95% of crypto in cold wallets. 4% of exchanges have been hacked in the last year. 12% of exchanges use a third party custody provider to store user assets, up from 9% as found in our last Benchmark in Q4 2019.

Data Provision and Trading

Only 8% of exchanges offer a full level 3 order book via REST or WebSocket connection. 32% of exchanges offer margin trading.

Transaction Risk

38% of exchanges were found to interact with high risk entities for more than 25% of transactions, according to CipherTrace's Interaction Risk data. Only 16% of exchanges use an external on-chain transaction monitoring provider.

Decentralised Exchanges

The top 3 decentralised exchanges based on our refined DEX methodology were Binance DEX, Switcheo and IDEX.

Legal/Regulation

Only 5% of exchanges formally offer some form of cryptocurrency insurance. Only 30% of exchanges are registered as an MSB or possess a crypto exchange license.

The methodology and rankings themselves are free and transparent and serve as a tool for market participants to choose the lowest risk platforms. The underlying data and custom research is also available to those looking to gain deeper insights. Get in touch by contacting us at research@cryptocompare.com

What has changed since the last ranking?

KYC/Transaction Risk Category. This category assesses KYC and transaction risk using CipherTrace's KYC and Interaction Risk ratings in combination with existing metrics such as whether an exchange uses and on-chain transaction monitoring provider and whether trade-monitoring is conducted on the platform.

Asset Quality/Diversity Category. This is used to assess the quality of coins offered on an exchange in collaboration with Flipside Crypto's FCAS coin ratings. This category also assesses the quantity of assets on offer such that traders might be able to diversify their trading portfolios.

DEX-specific Ranking. DEXs operate under different circumstances to centralised exchanges. They don't take custody of user funds, do not operate under the same regulatory constraints, nor offer a standard selection of markets. In order to more fairly rank DEXs in relation to one another, we have devised a simplified methodology sourcing part of the data from DappRadar.

Trade Monitoring and Investment Categories Repositioned. The former trade monitoring category has now been integrated into the KYC/Transaction Risk category while the investment metrics have now been integrated into the Team/Exchange categories.

Expanded Grading System to Include a "BB" Category. This was created to account for a greater scope of variance amongst our Top-Tier exchanges.

CIPHERTRACE

flipsidecrypto

DappRadar

Ranking Methodology Overview

Methodology Overview - Scope

Scope and Objectives

We combine **68 qualitative and quantitative metrics** to assign a grade to **over 165 active spot exchanges**. Each metric is converted into a series of points based on clearly defined criteria. Metrics were categorised into several buckets (see p.10) and distributed fairly to arrive at a final robust score, ensuring that no one metric overly influences the overall exchange ranking.

Grading

A grading system was implemented to assign each exchange a grade (AA, A, BB, B, C, D, E, F) based on its total cumulative score out of 100. **Top-Tier** exchanges refer to those that have scored at least 45 points (B and above).

Market Quality

We measure the market quality of each exchange using a combination of 5 metrics (derived from trade and order book data) that aim to measure the cost to trade, liquidity, market stability, behaviour towards sentiment, and "natural" trading behaviour. Exchanges were rated based on a combination of the most liquid BTC and ETH markets. Points were distributed using a rating system that compares each exchange with its peers for each metric, on each applicable market. We then arrive at an overall ranking that is robust across several markets for each exchange.

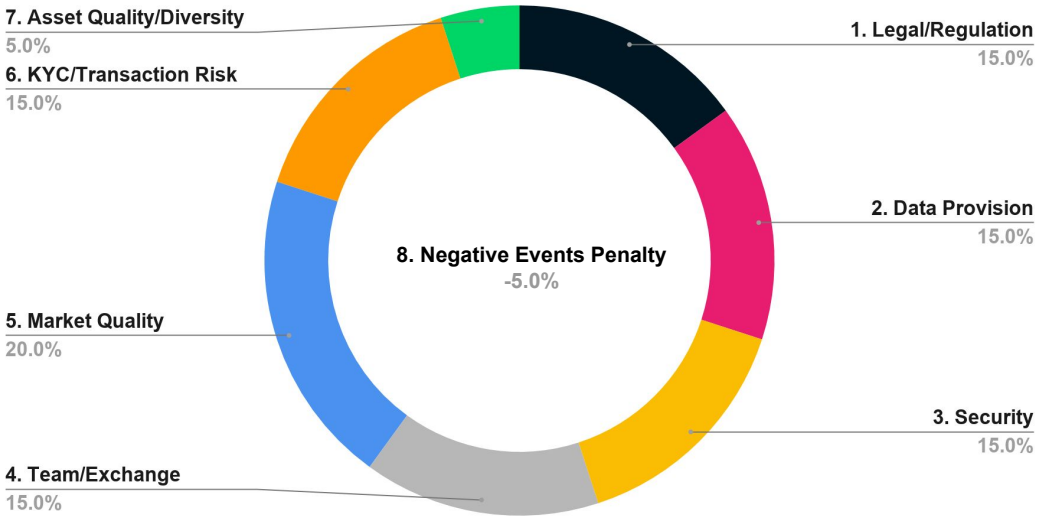
The market quality points should be considered most instructive **below a minimum threshold - with those scoring below 7.5 considered higher risk.**

**For further information on our methodologies, please contact* research@cryptocompare.com

Methodology Overview - Ranking Components

The overall ranking consists of the following components and subsequent weightings:

1. Legal/Regulation
2. Data Provision
3. Security
4. Team/Exchange
5. Market Quality
6. KYC/Transaction Risk
7. Asset Quality/Diversity
8. Penalty Factor: Negative Events (-5%)



Methodology Overview - Data Collection

Due Diligence

Time Period: 01 June - 30 June 2020

Sources: World Bank (2019 Data)
Transparency International (2019)
LinkedIn Profiles
Crunchbase Profiles
Exchange Websites
Github/Other API Documentation
Companies House
Media websites (Coindesk, Bloomberg)
Various MSB Registries
CipherTrace (June 2020)
FlipsideCrypto (June 2020)
DappRadar (June 2020)

Method: Manual Data Collection, Google Form, Collaborators

Market Quality (Trade)

Time Period: 01 June - 30 June 2020

Sources: Exchange REST APIs (Trade Endpoint)

Method: REST API polling on exchanges

Frequency: At exchange rate limits

Market Quality(Order Book)

Time Period: 01 June - 30 June 2020

Sources: Exchange REST APIs (Order Book)

Method: REST API polling snapshots

Frequency: ~ Every 10 mins

Markets: BTC-USD, BTC-USDT, BTC-ETH, BTC-KRW, BTC-JPY, ETH-USD, ETH-USDT, ETH-KRW, ETH-JPY…+ OTHER SIGNIFICANT FIAT MARKETS

Number of Exchanges: 100+

*We have made our best effort to collect data accurately, but appreciate that certain data points might be outdated or incomplete due to lack of public availability. We are committed to updating and correcting any data point proven to be outdated or incorrect on a timely basis, and will update our Exchange Ranking accordingly.

Methodology Overview - Components I.

Security

15%

- Formal Security Certificate
- SSL Rating
- Use of a Cold Wallet
- % Funds in Cold Wallets
- Geographical Distribution of Keys
- 2FA
- Custody Provider
- Number of Hacks (within 2 years)
- Any Recent Hacks (within 1 year)

Legal/Regulatory

15%

- Legal Company Name
- Registered as an MSB/Licensed
- Part of Regulatory/Industry Group
- Insurance Against Losses (Fiat, Crypto, Self-Insured)
- Country Rating
- Cryptocurrency Regulatory Stringency
- Sanctions Compliance Statement
- PEP Compliance Statement
- Chief Compliance Officer + Experience

KYC/Transaction Risk

15%

- Has Market Surveillance System in Place
- Conducted Internally or via a Formal External Provider
- On-chain Transaction Monitoring
- Strict KYC/AML Procedures
- CipherTrace KYC Score
- CipherTrace Transaction Risk Score

CIPHERTRACE

Methodology Overview - Components II.

Team/Exchange

15%

- Identity of CEO, CTO, COO, CFO, CCO, CISO (or equivalent)
- Education - Masters Degree/Formal Post-Graduate Certification
- Experience in Years
- Exchange Age Since Launch
- Funding by Large VC or Non-Crypto Established Company
- Funding by Smaller VC Companies

Data Provision

15%

- API Average Response Time (ms)
- Ability to Query Historical Trades
- Historical Candlestick Data
- Granularity of Candlestick Data
- Offers Websocket Connection OR FIX Connection
- Provides Order Book API Endpoint
- Maximum Order Book Level Offered
- API Rate Limits

Asset Quality/Diversity

5%

- Average Asset Quality based on FCAS scores by Flipside
- Number of Assets Available on the Platform

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Methodology Overview - Components III.

Market Quality

20%

- Market cost to trade (Average Spread)
- Liquidity (Average Depth of 1% Price Impact)
- Stability (Minute Volatility)
- Behaviour Towards Sentiment (Volatility and Volume Correlation)
- Natural Trading Behaviour (Volume Standard Deviation)

Trading Incentives (Inflation Score)

*Not Included in Ranking

- Trading Competitions
- Airdrops
- Transaction-Fee Mining
- Zero Transaction Fees
- Margin Trading

Negative Events

Penalty Factor - 5%

- Negative Reports such as a Flash Crash, a Legal Sentence or a Large Breach in Data Privacy

Methodology Overview - Aggregation and Grading

Scores from each category were aggregated to form a total cumulative score. The **maximum score is 100.**

Category	Maximum Points
Security	15
Legal	15
KYC/Transaction Risk	15
Management/Company	15
Data Provision	15
Asset Quality/Diversity	5
Market Quality	20
Total Cumulative Points Available	**100**

Threshold	Grade
Above 75	AA
65-75	A
55-65	BB
45-55	B
35-45	C
20-35	D
10-20	E
<10	F

DEX Methodology - Introduction

The Exchange Benchmark has always been a tool designed to evaluate and rank **spot exchanges** in order of how risky they are likely to be for the prospective trader. However, we are aware that while the methodology implemented may suit the majority of the exchanges in our research, there are several fields that unfairly penalised decentralised exchanges.

As a result, we have begun to modify the existing methodology to better assess decentralised exchanges in three ways:

1. We have removed any existing metrics that do not apply to DEXs.
2. We have adjusted existing categories to enable them to better assess each DEX.
3. We have added several metrics that apply to DEXs in a way that allows us to further differentiate them.

While our changes certainly improve how DEXs are assessed, there are further changes to be made given that the methodology was originally tailored for centralised spot exchanges. There is a longer term plan to refine the methodology moving forward, such that it includes a wider and more in depth selection of metrics that can better capture the nuances that are specific to DEXs.

At present our refined DEX methodology comprises the following components:

1. **Market Quality**
2. **Security**
3. **Team/Exchange**
4. **Data Provision**
5. **Engagement**
6. **Asset Quality/Diversity**
7. **Legal**
8. **Negative Events Penalty**

DEX Methodology - Ranking Components

Market Quality

20%

- Market cost to trade (average % spread)
- Liquidity (average depth of 1% price impact)
- Trading Volume

Security

20%

- SSL Rating
- White Hack Bounty Program
- 2FA
- Number of Hacks (within 2 years)
- Any Recent Hacks (within 1 year)

Legal

5%

- Legal Entity/Company Name

Engagement

15%

- # Users
- # Transactions/day

DappRadar

Team/Exchange

15%

- Identity of CEO, CTO,
- Education - Masters Degree/Formal Post-Graduate Certification
- Experience in Years
- Exchange Age Since Launch

Data Provision

15%

- API Average Response Time (ms)
- Ability to Query Historical Trades
- Historical Candlestick Data
- Granularity of Candlestick Data
- Offers Websocket Connection OR FIX Connection
- Provides Order Book API Endpoint
- Maximum Order Book Level Offered
- API Rate Limits

Asset Quality/Diversity

10%

- Average Asset Quality Based on FCAS scores by Flipside
- Number of Assets Available on the Platform

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DEX Methodology - Aggregation and Grading

Scores from each category were aggregated to form a total cumulative score. The **maximum score is 100.**

Category	Maximum Points
Engagement	15
Security	20
Legal	5
Team/Company	15
Data Provision	15
Asset Quality/Diversity	10
Market Quality	20
Total Cumulative Points Available	**100**

Threshold	Grade
Above 75	AA
65-75	A
55-65	BB
45-55	B
35-45	C
20-35	D
10-20	E
<10	F

Results

Exchange Ranking Top 20

Get the Benchmark scores using our API

Explore the full ranking on our Benchmark Dashboard

Exchange	KYC/Transaction Risk	Quality/Diversity of Assets	Legal/Regulation	Data Provision	Security	Team/Exchange	Negative Events	Market Quality	Total	Grade
Gemini	13.6	4.3	11.2	10.6	13.8	11.5	0.0	14.4	79.38	AA
Coinbase	11.9	4.5	10.4	8.8	15.0	12.1	0.0	15.2	77.82	AA
Kraken	7.2	4.8	10.8	10.1	10.9	13.7	0.0	14.2	71.56	A
itBit	13.3	4.0	8.5	10.1	10.7	13.9	0.0	10.8	71.23	A
Bitstamp	10.9	4.3	10.4	8.3	9.1	12.1	0.0	15.4	70.35	A
Liquid	13.6	2.8	11.9	8.5	8.3	10.7	0.0	13.0	68.85	A
bitFlyer	11.9	4.0	12.7	8.0	5.8	10.7	0.0	14.8	68.00	A
Binance	11.9	3.5	5.4	11.1	11.0	8.6	0.0	16.4	67.91	A
Bitfinex	8.9	3.5	8.8	10.9	7.1	10.7	0.0	16.6	66.48	A
Cex.io	8.5	3.8	9.2	10.1	12.5	11.0	0.0	11.2	66.31	A
LMAX Digital	7.8	4.0	10.0	10.3	10.7	10.7	0.0	12.4	65.96	A
FTX	7.2	4.3	5.4	12.9	10.9	8.6	0.0	15.0	64.23	BB
Luno	9.9	4.0	7.7	8.5	10.5	9.9	0.0	13.6	64.09	BB
Bittrex	10.6	2.8	12.7	6.5	7.1	10.2	0.0	13.6	63.36	BB
OKCoin	8.5	4.5	9.2	10.6	7.1	10.7	0.0	12.6	63.23	BB
Currency.com	13.3	5.0	2.3	11.4	10.6	8.0	0.0	12.6	63.20	BB
Huobi Global	7.8	2.8	6.5	8.0	9.2	11.0	0.0	17.4	62.73	BB
OKEX	8.5	2.8	6.9	10.6	7.1	10.2	0.0	16.4	62.44	BB
Poloniex	10.9	3.5	5.0	10.1	7.1	8.6	0.0	17.0	62.17	BB
Independent Reserve	13.3	4.5	9.6	4.4	8.6	8.0	0.0	12.6	61.01	BB

DEX Ranking Top 10

Get the Benchmark scores using our API

Explore the full ranking on our Benchmark Dashboard

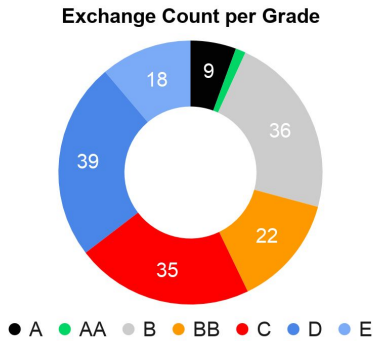
Exchange	Engagement	Quality/Diversity of Assets	Legal/Regulation	Data Provision	Security	Team/Exchange	Negative Reports	Market Quality	Total	Grade
Binance DEX	9.0	1.8	5.0	11.1	16.0	11.3	0.0	8.6	62.69	BB
Switcheo	6.0	3.3	5.0	8.5	19.0	5.6	0.0	11.4	58.84	BB
IDEX	9.0	1.3	5.0	11.1	6.0	10.0	0.0	15.2	57.57	BB
DDEX	1.0	2.0	5.0	5.4	16.0	4.4	0.0	17.1	50.95	B
Uniswap	7.0	3.3	0.0	5.9	14.0	5.0	0.0	14.3	49.48	B
Bisq	6.0	3.3	5.0	6.7	8.0	3.1	0.0	14.3	46.38	B
Aidosmarket	0.0	4.3	5.0	4.4	10.0	3.8	0.0	11.4	38.85	D
Poloni DEX	9.0	4.3	0.0	4.1	6.0	0.6	0.0	3.8	27.82	D
Everbloom	0.0	3.5	0.0	6.2	2.0	5.6	0.0	0.0	17.33	E
TN DEX	0.0	3.5	0.0	3.1	6.0	2.5	0.0	2.0	17.10	E

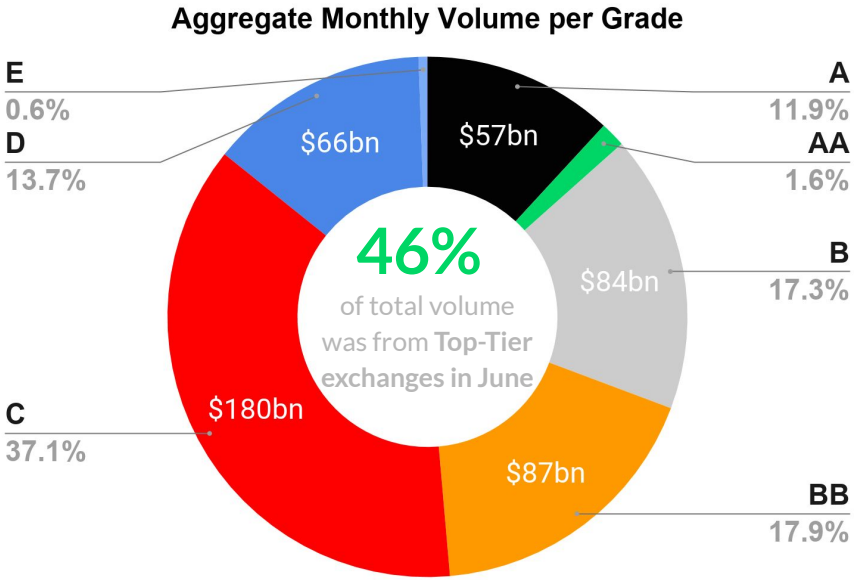
Top-Tier Volumes - Grades B and Above

CryptoCompare has established the notion of **Top-Tier volume** whereby investors can segment the market into higher and lower risk volumes.

We currently define Top-Tier volume as volume derived from exchanges scoring a B and above.

This equates to a total of **68 exchanges** that we have rated **Top-Tier** for the current review.





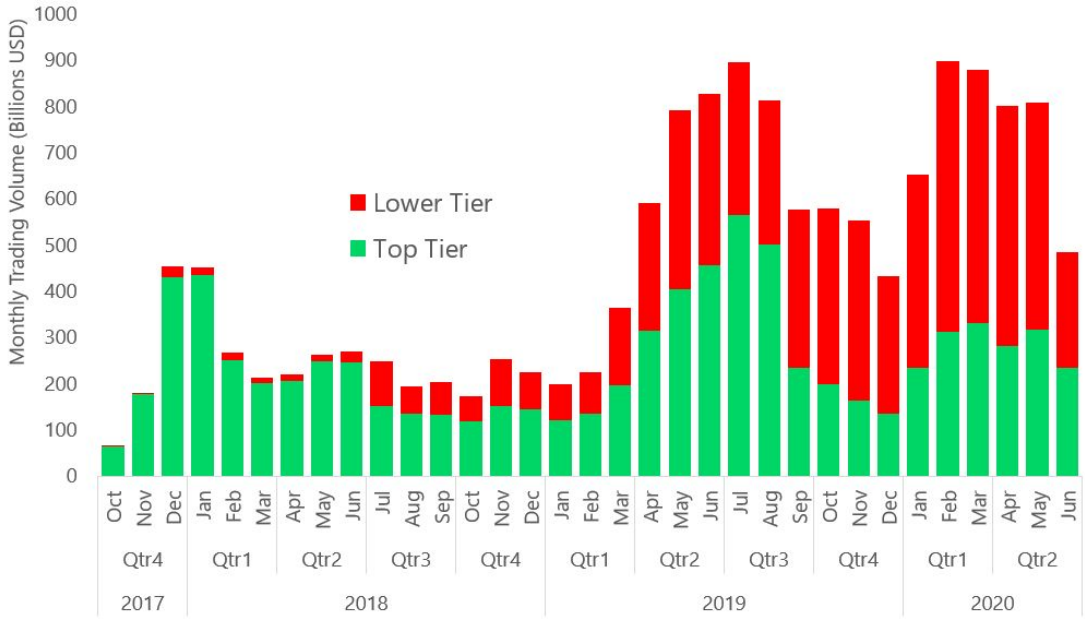
Lower-Tier Exchanges Lost Market Share

Top-Tier Volumes Continue to Gain Market Share

Over the last three quarters, and following the latest Benchmark update, Lower-Tier exchanges (grades C-E) have continued to lose market share to Top-Tier exchanges (grades AA-B) quarter on quarter.

Top-Tier exchanges (grades AA-B) accounted for 32% of global volumes in Q4 2019. In 2020, they accounted for 36% in Q1 and 40% in Q2. Lower-tier exchanges (grades C-E) accounted for 68%, 63% and 60% in the last three quarters respectively.

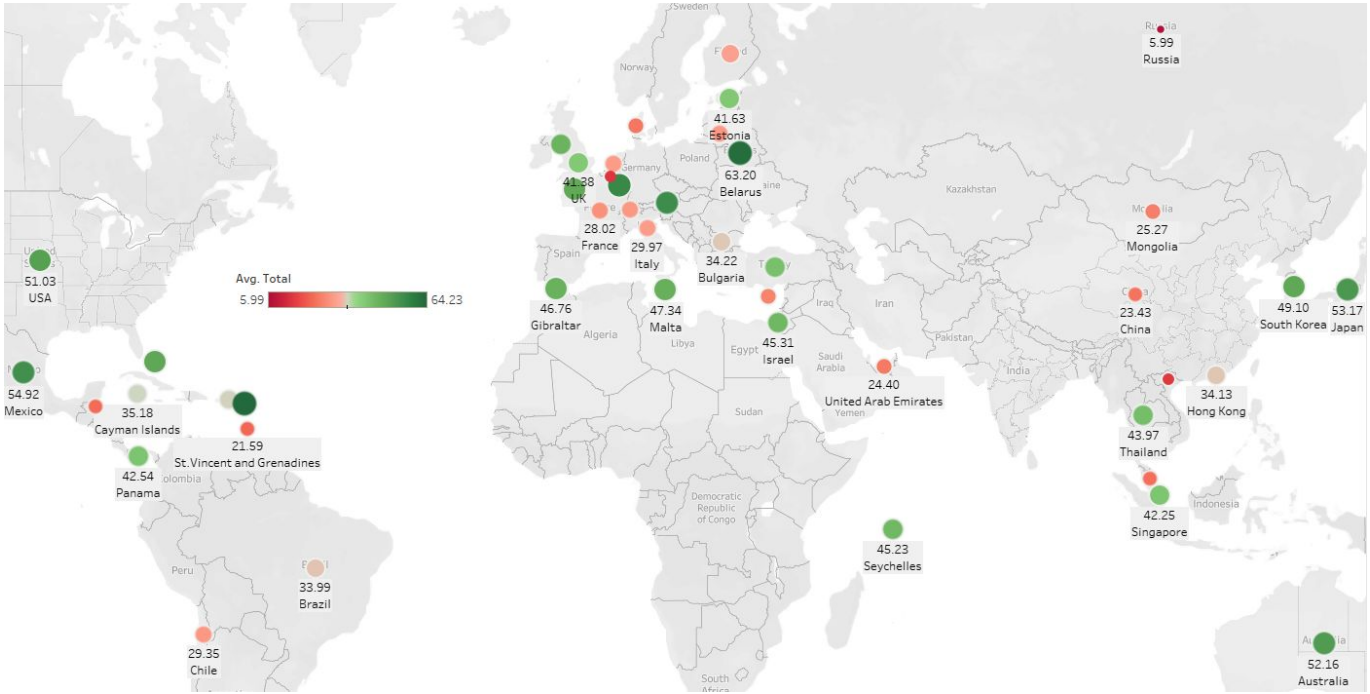
In June, Top-Tier exchanges accounted for 46% of global volume while Lower-Tier exchanges accounted for 54%.



Average Ranking Score Per Location

Our results show that in average terms, exchanges based in the Luxembourg, Japan and the USA are among those boasting the lowest risk exchanges. Other high scoring countries include Australia and South Korea.

Legal jurisdiction forms only a small component of our overall risk ranking. However, exchanges that reside in jurisdictions with higher quality regulatory frameworks tend to perform better across several risk metrics.



*note that certain exchanges might operate across multiple jurisdictions. Therefore this visualisation serves only as a general tool for identifying jurisdictional trends.

GDF GLOBAL DIGITAL FINANCE

Advocating & accelerating the adoption of digital assets

Our members are industry experts, business leaders, and technologists, committed to championing the new era of digital commerce.

Our community is:

- Establishing best practices and governance standards
- Conducting global regulatory and policy maker outreach
- Curating and sharing expert insights

Join us to:

- Demonstrate accountability and commitment to best practices through Code attestment
- Share knowledge by taking part in our events, webinars, calls and more
- Network in a shared engagement forum with market participants, policymakers and regulators

Become a member at gdf.io

8
Codes of Conduct released

10+
Regulator consultations

50+
Events & networking opportunities

75+
Members in Code Attestment Programme

175+
Global members

Our Patron Members

CONSENSYS

DIGINEX

DLA PIPER

Hogan Lovells

Huobi

r3.

★★★★☆ 4.2

"GDF Codes set global best practices and standards for the Crypto Digital industry."

GDF members survey

Category Stats

Regulation/Legal

8%

of exchanges do not openly reveal the **legal entities** associated with their exchange

30%

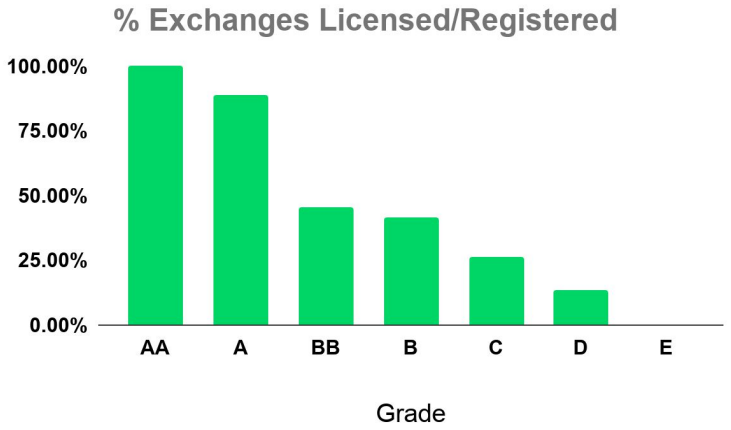
of exchanges are registered as an **MSB or possess a crypto exchange license**

ONLY **5%**

of exchanges formally offer some form of **cryptocurrency insurance**

2%

of exchanges **informally insure** users in the case of breach (insurance fund)



KYC/Transaction Risk

*For a more detailed explanation of the metrics in the below charts, please see Page 62: 4. KYC/Transaction Risk. These metrics have been sourced using CipherTrace's proprietary risk assessment dataset.

16%

of exchanges use an external **on-chain transaction monitoring** provider

56%

of exchanges impose **strict ID verification** requirements on users

38%

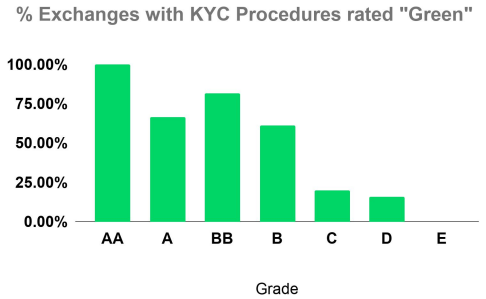
of exchanges were found to interact with **higher risk entities** for more than 25% of transactions according to **CipherTrace**

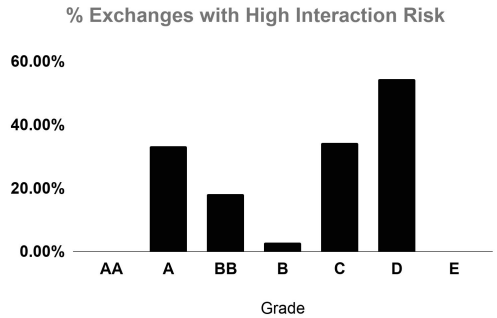
ONLY **4%**

of exchanges formally engage with an external **trade monitoring provider**

44%

of exchanges were rated as having **poor or inadequate KYC** programs according to **CipherTrace**





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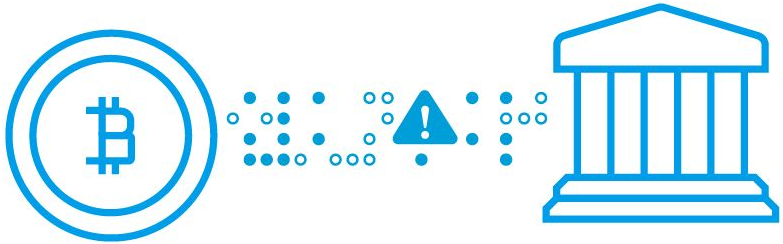
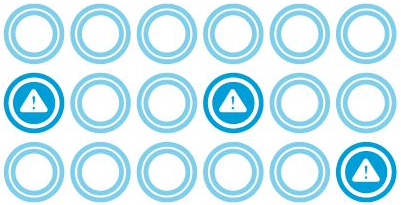
Mitigate Virtual Asset Compliance Risks



Exchange Risk Profiling



Monitor VASP KYC practices and money laundering risks

Trace Tokens

Identify tokens from high-risk sources

Cryptocurrency AML

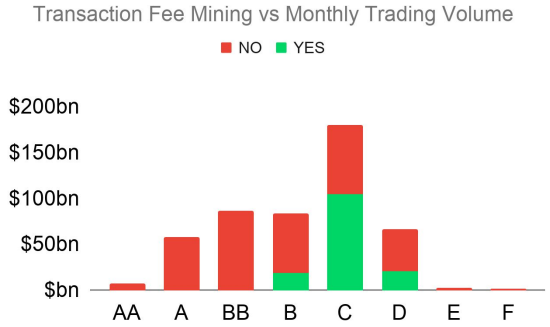
Risk rate transactions and comply with AML regulation

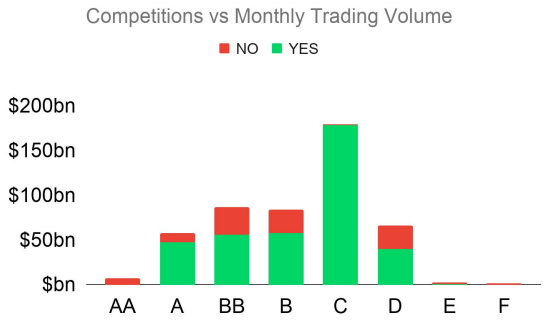
Learn more at www.CipherTrace.com

Trading Incentives

12%

of exchanges implement **transaction fee mining** models





6%

of exchanges offer **no-fee trading** as part of their basic pricing model

47%

of exchanges incentivise and reward traders with the use of **airdrops**.

32%

of exchanges offer **margin trading**

41%

of exchanges have conducted some form of **trading competition** to drive volume

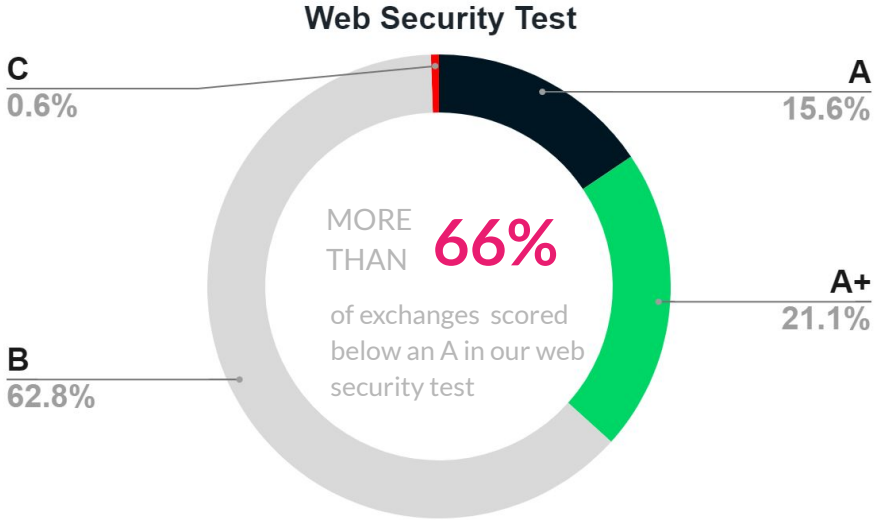
Security

4%

of exchanges have been hacked in the last year

7%

of exchanges possess an ISO 27001 or SOC2 certificate



15%

of exchanges state they **hold more than 95%** of crypto in cold wallets

95%

of exchanges offer 2-factor authentication

12%

of exchanges utilise the services of a custody provider to store user assets

Good at keeping secrets

Affordable excellence in institutional crypto custody.

Crypto markets move lightning-fast. To capitalise, you need an insured, secure custodial wallet solution that enables your institution to move quickly and safely when opportunities arise. A partner who will keep your private keys protected without compromising speed.

That's why we built TrustVault.

Combining instant access, best-in-class security, subsecond processing times and advanced transaction controls, we deliver the industry's leading digital asset custody solutions on-chain, on-exchange and across DeFi. So carry on exchanging. We've got you covered.

Trustology

Make the move.
Create a TrustVault Business Account today.

Book a demo
sales@trustology.io

Learn more
contact@trustology.io

Chat to us
+44 7706 279505

Data Provision

43%

of exchanges provide historical candlestick data

83%

of exchanges that provide historical candlestick data, offer at least **a minimum of minute granularity**

37%

Of exchanges offer the ability to **query full historical trade data** via an API endpoint

53%

of exchanges **offer a websocket data feed** that users can subscribe to

71%

of exchanges offer **at least a level 2 order book** via REST or Websocket connection

ONLY **8%**

of exchanges offer **a full level 3 order book** via REST or Websocket connection

Transparency, ease of access, and speed of data provision are important foundations for a fair and efficient marketplace

Data Provision

AA-rated exchanges had an average public REST API **response time** of

504 ms

AA-rated exchanges had an average public **rate limit** of

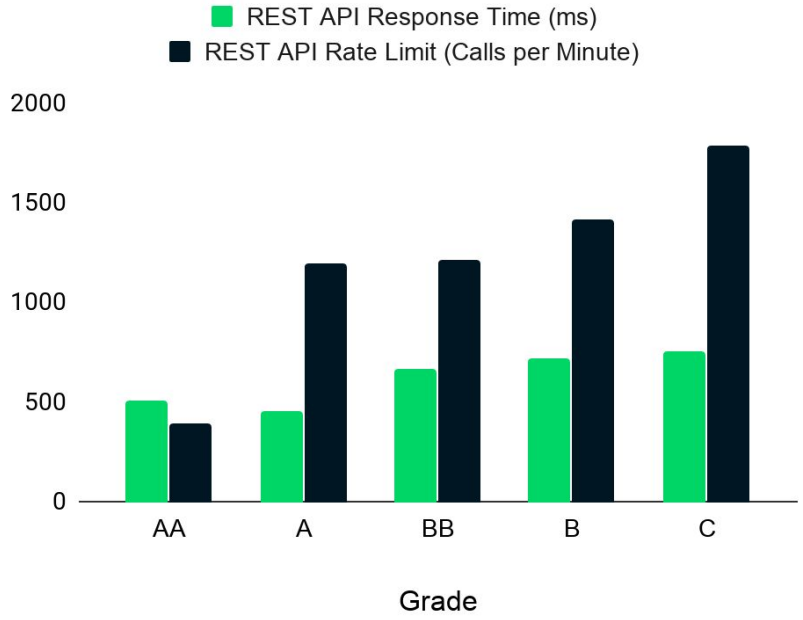
390 calls/min

Across all exchanges the public average REST API **response time** was

727 ms

Across all exchanges the average **rate limit** was

1397 Calls/min



*Note that API response time refers to the average time for a request for order book data to be completed end to end using a public REST endpoint. This is averaged across all markets per exchange.

Contact

The Benchmark is backed by thousands of research hours and covers 68 qualitative and quantitative metrics. Updated twice annually to reflect the fast-changing cryptoasset landscape, we work hard to ensure the accuracy of all the data comprising the Benchmark. If there is any part of the Benchmark that you would like to discuss, please reach out to us.

Speak to us if you are interested in any of the following:


Custom Reporting


Detailed Benchmark Scores


Underlying Data

CryptoCompare Research

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Special thanks to the CryptoCompare content and support teams for their data collection assistance.

Get the Benchmark scores using our API

Appendix

Appendix Contents

Appendix A - Due Diligence Methodology

Qualitative Data Metrics

1. Trading Incentives
2. Security
3. Legal/Regulation
4. KYC/Transaction Risk
5. Team and Company
6. Data Provision
7. Asset Quality/Diversity
8. Negative Events

Data Collection. Qualitative data was collected and/or updated manually between **01 June - 30 June 2020**. The metrics within each category were collected from a variety of sources, which include but are not limited to: the World Bank (2017 Data), LinkedIn Profiles, Crunchbase Profiles, Twitter, Exchange Websites, Github API Documentation, Companies Houses, Media websites (Coindesk, Bloomberg), and Various MSB Registries.

An effort was made to collect each metric as accurately as possible. However, we acknowledge that due to restrictions in terms of public data availability and transparency from certain exchanges, data may be outdated or incomplete. For those who are unhappy with the current ranking, or feel that any data is not up to standard we are committed to providing the most reliable data set and will ensure that any errors are dealt with quickly and the exchange ranking updated accordingly.

1. Trading Incentives

Exchanges implement various incentive schemes for several reasons, which might include: **attracting additional users** to the platform, **incentivising trading** to drive fee income, and **raising the profile** of the exchange or of certain coins via high volumes to top the volume rankings tables.

Incentive Schemes. In the context of the current study, we have compiled a list of five main **incentive schemes** that we believe encourage additional trading and are often implemented by several exchanges:

A. Trading Competitions
B. Airdrops
C. Transaction-Fee Mining
D. Zero Transaction Fees
E. Margin Trading

Inflation Score. The presence of any of these incentive schemes **does not penalise** exchanges in the current ranking system, but only serves as a means of identifying the extent of potential **"volume inflation"** relative to volumes without such models in place. The reason for this is that incentive schemes do not necessarily imply a lower quality exchange. Each metric acts as a flag for "inflated volume" and contributes to a final "inflation score".

1.A Trading Competitions

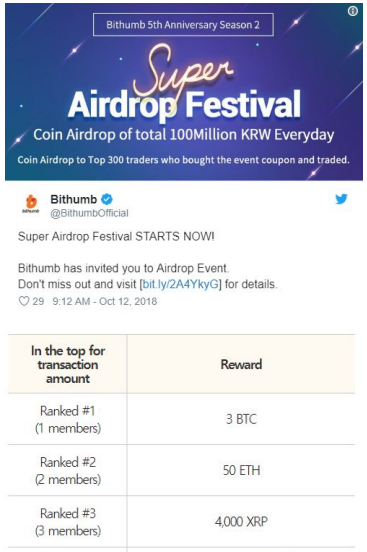
Trading competitions are sometimes implemented by exchanges to **attract more users** to the platform, to **incentivise trading** and hence drive fee income, or to **raise the profile** of the exchange via volume rankings.

The exchange will reward participants with cryptocurrencies such at BTC or ETH or other lower profile tokens based on their performances in each competition. Bithumb for example, has implemented a number of events known as “Super Airdrop Festivals” in the past, which have had a clear effect on trading volumes for the duration of each competition.

Competitions vary considerably by structure, and by exchange, and can result in **erratic trading** behaviour. Once a competition is over, this can cause a **drop in volumes** to “normal” levels.

Offering trading competitions does not penalise exchanges in our current ranking system, however their presence is used to flag potential “volume inflation”. We add 5 points to the current “inflation score” if a competition has occurred in the last year. It should be noted that this metric does not serve to detect **current** inflation given that a competition may not necessarily be ongoing, but rather serves as an indication of **potential** and **past inflation** as a result of competitions.

Competitions	Inflation Points
YES	5
NO	0



1.B Airdrops

An airdrop is a **token distribution mechanism** in which free tokens are deposited into a users wallet based on several requirements. Most airdrops are deposited to users based on their holdings of a particular cryptoasset such as BTC at the time of a designated “snapshot” of holdings. However, some airdrops are only offered to users provided that they trade a minimum quota of a given market volume per day.

Airdrops can therefore be used as an **incentive mechanism**. We assume that exchanges that enable the airdrops of various tokens - whether as a competition reward or as a promotional event - will **encourage users to trade** on markets they may not have engaged with, had there not been an airdrop offering.

For this reason, we designate 2.5 “inflation points” to exchanges that offer airdrops. We do not penalise exchanges for the presence of airdrops in our current ranking system.

Offers Airdrop Events	Inflation Points
YES	2.5
NO	0

1.C Transaction-Fee Mining

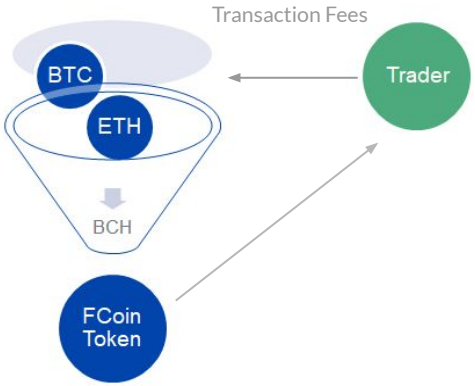
An exchange that implements a transaction-fee mining model, will **distribute** their proprietary **exchange token** in **exchange for trading fees**. In other words, they offer up a trading fee rebate, paid back in the form of their own token.

This is very similar to an ICO in terms of structure, as users pay fees in the form of BTC, ETH, USDT etc. and receive a specific quantity of exchange tokens in return.

This trading incentive scheme first rose to prominence in mid-2018 and was used by exchanges such as FCoin, BigONE and CoinBene whose volumes topped exchange volume rankings overnight as a result.

The **more trading** that occurs, the **more tokens can be earned** by individual traders. There is therefore an incentive to trade more, given that these tokens have particular properties.

This metric is therefore used as an additional proxy for “exchange inflation”. Given the clear impact on volumes that has been seen with this model, exchanges that operate under this model will be assigned an additional **15 inflation points**.



Implements a Transaction-Fee Mining Model	Inflation Points
YES	15
NO	0

1.D Zero Transaction Fees

Several exchanges might implement a zero trading fee model, the ultimate aim of which is to **incentivise additional trading** activity and attract users. With fees eliminated, the costs of trading are effectively eliminated and therefore traders are incentivised to trade more.

It is common for exchanges to offer a zero fee model to market makers, whose presence adds important liquidity to a given market. This effectively makes a market more active and stable. However, for market takers this is far less common. Hence, in our model, **zero transaction fee models refer to fees offered to takers** rather than makers.

Given that transaction fees are eliminated, an exchange must earn revenue by some other means which may include charging listing fees for new coins, offering margin trading and earning interest on leveraged funds, or implementing paid marketing campaigns for certain projects.

In our ranking points system, exchanges are not penalised for offering zero fees. However, a zero fee model will be reflected in a general “trading inflation score” for each exchange.

Implements a Zero-Fee Trading Model	Inflation Points
YES	5
NO	0

1.E Margin Trading

Margin trading is a method of trading cryptoassets using **borrowed funds** provided by a third party.

This enables traders to trade with **much larger sums of capital** such that they are able to leverage their positions and realise larger profits on successful trades. As a result, this tends to **inflate volumes** to levels that would not have been realised had there been no margin trading in place.

Borrowed funds can either be provided by other users on the platform, and in many cases exchanges themselves offer such lending services. This model can offer an additional revenue stream for exchanges that offer particularly low fees and choose to make up the shortfall with interest earned from margin traders.

Given that margin trading tends to increase the amount of capital that can be traded and hence overall trading volumes, 5 “inflation score” points were given to exchanges that offer this service.

Offers Margin Trading	Inflation Points
YES	5
NO	0

2. Security

A. Formal Security Certificate
B. SSL Rating
C. Use of a Cold Wallet
D. % Funds in Cold Wallets
E. Geographical Distribution of Keys
F. 2FA
G. Custody Provider
H. Number of Hacks
I. Any Recent Hacks

Exchanges are key targets for cyber security attacks. They deal with sensitive user data and private keys, which exchanges must protect. Although security is one area where less transparency can mean more safety, we have curated a series of high level metrics that we believe help to highlight exchanges that have paid particularly close attention to platform and user security.

2A. Formal Security Certification

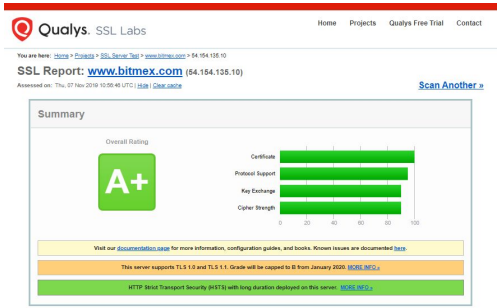
Security Certificate: There are two primary certifications (or attestation standards) we focus on that are used to attest to a company's effectiveness at controlling and protecting the data they use. In North America, this is the SOC 2, which reports on controls at a Service Organization relevant to security, availability, processing integrity, confidentiality or privacy. Its purpose is to help ensure that a company has met established security criteria and is adequately protected against unauthorized access.

At an international level, this is the ISO 27001, which is designed to give a best practice framework for implementing an information security management system at an organization. Both standards are internationally recognised. We award 5 points for possessing formal standards and 1.5 points for those in the process of obtaining them.

Formal Security Certification	Security Points
YES	5
IN PROGRESS	1.5
NO	0

2B. SSL Rating

SSL rating: We use the grading system from Qualys SSL Labs which grades websites' SSL (Secure Sockets Layer) protocol. Where Qualys' rating failed for any exchange, we use the rating from ImmuniWeb. While the test was not done for all possible IP addresses associated with a given exchange, our points system penalises those with a low score for a single domain, as this alone represents a potential security hole.



SSL Rating	Security Points
A+	3
A	2.5
A-	2
B+	1
B	1
B- and below	0

2C & D. Cold Wallet Storage and Ratio

Offline Storage: Whether an exchange makes use of offline - or 'cold' - storage, widely considered a more secure means of storing cryptoassets (i.e. cryptoasset private keys). Cold storage is considered more secure as keys are siloed away from internet access, with most historical hacks having taken place via hot wallets.

Offline Storage	Security Points
YES	2
NO	0

Cold Wallet Ratio: The ratio of an exchange's cold to hot wallets, i.e. how many of its cryptoassets are stored online vs. offline. We assume that the higher the ratio the more secure an exchange. For exchanges that have stated a specific percentage, a scaling factor of 3 has been applied.

For example, if an exchange states 90% of funds are stored in cold wallets, the points awarded will be 0.9 * 3 = 2.7.

If an exchanges states that the majority of funds are in cold wallets, a score of 2 is awarded. If there is some indication that a cold wallet is used, a score of 1 is awarded.

Offline Storage	Security Points
100% Cold	3
Majority Cold	2
Some Cold	1
No Evidence	0

2E/F/G. Geographical Key Distribution, 2FA and Custody Provision

E. Geo-Key Distribution: Whether an exchange implements geographical distribution of cryptoasset private keys: we assume that distribution entails greater security. Our assessment is based on the exchange's own statement of the distribution of keys. We award 1 point for an exchange that distributes its keys.

Geo Distribution	Security Points
YES	1
NO	0

F. 2FA: Whether an exchange offers 2 Factor Authentication for individual account security. A widely-recognised security standard which safeguards customer information, we consider an exchange without 2FA to have a serious security flaw. We award 2 points to an exchange for implementing 2FA.

2FA Authentication	Security Points
YES	2
NO	0

G. Custody Provider: Whether an exchange makes use of a custody provider to store their cryptoassets. In addition to offering greater security measures, some custody providers such as Bitso, also adhere to ISO 27001 standards.

We assume that in general, the use of a competent custody provider entails a greater standard of security and therefore will score a higher rating. We award 3 points to an exchange that makes use of a custody provider.

Custody Provider	Security Points
YES	3
NO	0

2H & I. Hacks

Number of hacks/Recent hacks: This refers to whether an exchange has been hacked in its core infrastructure - with funds or vital information extracted. While some exchanges have had social media accounts compromised, this does not form part of this assessment.

Because we are aware that exchanges can improve their infrastructure, we focus primarily on the number of recent hacks - i.e. hacks in the last year, that likely came about as a result of failure to implement industry best practices. We also assume the number of hacks to be significant as those that have been hacked more than once have likely failed to respond to weaknesses in their infrastructure.

We deduct 3 points for an exchange with more than 1 hack in the last 2 years, and deduct 5 points if a hack has taken place in the last year.

No. of hacks in 2 years	Security Points
More than 1	-3
NO	0

Hacked Recent	Security Points
YES	-5
NO	0

3. Regulatory/Legal

A. Legal Exchange Name
B. Country Risk Rating
C. Country Cryptocurrency Regulation
D. Country Regulatory Stringency
E. Registered as an MSB/Licensed
F. Part of Regulatory/Industry Group
G. Insurance Against Losses (fiat, crypto, self-insured)
H. Sanctions compliance statement
I. PEP compliance statement
J. Chief Compliance Officer + Experience

3.A Legal Exchange Name

It is important that the **legal name** of each exchange is available publicly. Firstly, this enables the search of relevant company **documents**, country/regulatory **registrations** and **licenses**. It also allows for **identification of which legal parties** are necessary to file a complaint/legal dispute and who is legally accountable if such an issue arises.

Ultimately, if no legal name can be found it can also be difficult to assess the quality of an exchange, where it is based, or who runs the company.

Therefore, our ranking takes into account whether a legal operating name for each exchange can be found. If so, it is awarded 5 points. If no name can be found, it receives 0 points.

Legal Exchange/Operator Name Found	Points
YES	5
NO	0

3.B Country Risk Rating

A **country risk rating** is a proxy for the **institutional quality** of the jurisdiction in which an exchange is based. It provides an indication of the likelihood of corruption as well as how strong a country's legal systems are. An exchange based in a high quality jurisdiction is subject to the standards and legal strictures of that country and therefore exposes users to a lower level of risk.

Country Risk Ratings are calculated using a combination of data from the **World Bank Worldwide Governance Indicators (WGI Ratings)**, **Transparency International**, and **Euler Hermes** Ratings.

The WGI Rating are based on the following six dimensions of governance, which were rescaled to fit a 0-9 scoring format and averaged: "Rule of Law, Regulatory Quality, Government Effectiveness, Political Stability and Absence of Violence/Terrorism, Control of Corruption, Voice and Accountability." Transparency International ratings are a similar proxy for institutional quality by providing a rating of corruption levels in each major country. This was again rescaled to fit a 0-9 format. Euler Hermes ratings measure the financial and other credit risk factors in each major country. We score each country based on the average of the above ratings providers.

Exchanges operate from various jurisdictions. Our assumption is that the quality of a country's institutions will influence exchange standards positively i..e. **higher quality institutions enforce higher standards upon the businesses based there**.

Based on scores 0-9 - we categorise countries into Low Risk, Medium Risk, High Risk, Very High Risk.

EULER HERMES Global

TRANSPARENCY INTERNATIONAL UK fighting corruption worldwide

World Governance Indicators

THE WORLD BANK IBRD • IDA | WORLD BANK GROUP

Risk	Rating
Low	9
Medium	6
High	3
Very High	0

3.C/D Crypto Exchange Regulation/Regulatory Stringency Rating

Our **cryptocurrency exchange regulation rating** relates specifically to the existence of regulatory frameworks that crypto exchanges fit into. This captures the possibility that certain jurisdictions may contain high quality institutions but may not necessarily impose specific regulatory requirements on crypto exchanges (e.g. sandbox environments).

Exchanges might generally choose to locate themselves in jurisdictions that have clear rules regarding cryptocurrency exchange activity, or in those that generally impose very lax or non-existent regulations.

We assume that exchanges based in countries that possess clear regulatory frameworks relevant to cryptocurrency exchanges, generally indicates a more compliant calibre of exchange.

We therefore introduce points scored from 0 to 3 to capture the level of regulation or frameworks that crypto exchanges must meet in order to operate, such as obtaining specific licenses or any registration requirements with regulators.

Regulatory stringency ratings are based on how difficult, in general, it is to receive a license (if applicable), or comply with ongoing reporting or registration requirements in each exchange jurisdiction.

This metric attempts to take into account that certain environments may impose relatively more lenient or stringent regulatory frameworks or licensing requirements in place.

The assumption is that the more difficult the registration/licensing/approval requirements (given existing regulation) for any given exchange, the higher the quality of an exchange. E.g. It is difficult to obtain a BitLicense.

We award points from 0-3, with 3 being difficult to comply with, 2 being moderately difficult, 1 being relatively easy, and 0 being not applicable.

Rating	Basic Criteria
3	Exchanges are regulated, licensed and must register with the relevant regulatory authority. Legislation is comprehensive.
2	Regulatory stance is a grey area, some crypto exchange legislation, and some form of registration/licensing may be required.
1	Relatively unregulated, minimal registration required with financial/regulatory authorities. Minimal/no legislation.
0	No regulation or crypto exchange legislation to be found

Rating	Basic Criteria
3	Difficult
2	Medium
1	Relatively Easy
0	Not Applicable

3.E Registered as an MSB (Money Services Business)

Several exchanges are registered as **Money Services Business (MSBs)**. Although not obligatory in many jurisdictions, exchanges that are registered are normally subject to stricter reporting standards to those that are not.

For instance, those registered with **Financial Crimes Enforcement Network** (FinCEN) must identify ownership roles and controlling stakes within the company, establish a formal Anti-Money Laundering (AML) policy, enforce strict KYC procedures, and file any suspicious activity reports among several other obligations. Those registered with the **Japanese FSA** or the **UK Financial Conduct Authority (FCA)** may have similar reporting obligations.

Although we realise the not all jurisdictions will require this form of registration or may have different standards, we attempt to **reward exchanges that are registered with a regulatory authority** that maintains oversight over exchange activities. We attempt to provide a **general gauge** as to which exchanges have reporting obligations to regulatory authorities over how strict or comprehensive those reporting obligations are at this time. We also note that this metric may be biased in favour of fiat to crypto exchanges, given that crypto to crypto exchanges are generally less exposed to such requirements.

We make the assumption that when exchanges are licenced with a regulatory authority, this is also equivalent to being “registered as an MSB”. We do not assume the reverse however.

Ultimately, our main assumption is that exchanges that are **registered as MSB or equivalent**, are imposed to **stricter reporting standards** and **hence higher operational quality**. Exchanges that are registered, regardless of the regulatory authority are designated maximum of 12 points. However we also apply a multiplier (stringency factor from 0-3) to take into account that certain authorities may be more lenient than others.

Registered as an MSB or Equivalent	Points
YES	12 * (stringency factor/3)
NO	0

3.E Licensed Exchanges

Although not required in many jurisdictions, obtaining an exchange license indicates that an exchange must maintain certain reporting, legal and monitoring standards. It also indicates that an exchange is most likely compliant with local regulations.

The **State of New York** requires that cryptocurrency exchanges register with the New York State Department of Financial Services (NYSDFS) to obtain a **BitLicense**. This is contingent upon maintain specific operational standards and passing various reviews.

Similarly, **Japan** requires exchanges to register with the FSA such that they can obtain approval to operate. Other jurisdictions such as **Estonia** licenses exchanges via the FIU with a designated license for operating a digital currency exchange.

Not all exchanges must be licensed, however those that are licensed are assumed to operate under higher standards than those that are not, **i.e. possession of a license is indicative of a higher quality exchange**.

However, not all licenses are made equal. We attempt to differentiate this by implementing regulatory stringency rating multiplier (0-3). Exchanges receive points between 0-12 depending on this factor.

Licensed	Points
YES	12 * (stringency factor/3)
NO	0

3.F Member of Regulatory/Industry Group

Several cryptocurrency exchanges are members of cryptocurrency industry groups. Their respective purposes vary between developing a code of conduct within the industry, assisting in terms of innovation, or offering a form of self-regulation and advice to other cryptocurrency exchanges.

Examples of what we could consider **self-regulatory membership** groups include: Japan's Virtual Currency Exchange Association (JVCEA), Global Digital Finance (GDF) and the Chamber of Digital Commerce. We assume that if an exchange is a member of an SRO, they must conform to certain membership rules and codes of conduct. **2 points** are awarded to exchanges that maintain membership in an SRO

More **general crypto industry groups** include bodies such as the Virtual Commodity Association Working Group (VCA). While membership requirements may not be as stringent as in an SRO, exchanges that are part of these industry groups might participate in order to generally **improve the space**. They are known in the industry and thus assume to be more **transparent**, and they importantly **maintain a code of conduct** within their industry group in order to maintain their member status. **1 point** is awarded when exchanges are a member of **at least one** industry group.

一般社団法人
日本仮想通貨交換業協会
JVCEA - Japan Virtual Currency Exchange Association

GDF

CHAMBER OF DIGITAL COMMERCE

TRISA

Member of a Self-Regulatory Organisation	Points
YES	2
NO	0

Member of a Cryptocurrency or Blockchain Industry Group	Points
YES	1
NO	0

3.G Insurance Against Losses

Several exchanges offer insurance for certain funds held in custody by the exchange. It is assumed that for exchanges to seek to offer such a service to their customers, they must first prove that they have met certain standards such that they can solicit the services of an insurer. It also serves as a declaration of taking responsibility for unexpected losses that occur on the part of the exchange.

Exchanges that guaranteed coverage in terms of lost funds will ultimately expose users to a relatively lower risk service than exchanges that are yet to offer such a service. We consider the offering of such a service to be highly indicative of the quality of an exchange.

We grade exchanges based on three main categories of insurance:

1. Insurance for **fiat funds** held by the exchange (FDIC insurance excluded)
2. Formal cybersecurity insurance for **cryptoassets**
3. **Self-insured** via a “fund” in the case of a hack

We believe that although self-insurance is a way of ensuring clients via their own balance sheet, a public declaration to compensate users in the case of a hack with a pool a funds is one indicator of quality.

We award 3 points for fiat insurance, 3 points for cryptoasset insurance **or** 1 point for a self insurance fund.

Insurance Fiat	Points
YES	3
NO	0

Insurance Crypto	Points
YES	3
NO	0

OR

Self Insurance Fund	Points
YES	1
NO	0

3. H/I - Sanctions Compliance/PEP Screening

Sanctions Compliance

It is important when assessing exchange quality to note when exchanges comply with sanctions rules and international recommendations. This will vary from country to country, however the ultimate aim is to state compliance with local regulations and to limit funds entering an exchange from any illicit sources.

Although we are unable to check for compliance via public sources, we assume that at the bare minimum that an exchange that states it has complied with certain country restrictions or compliance with UN sanctions lists, indicates at least an intention to comply with certain rules. For this we award **1 point**.

Sanctions/Country Restrictions Statement	Points
FOUND	1
NOT FOUND	0

PEP Screening

PEP (Politically Exposed Persons) screening refers to screening for a person who serves or has served in a prominent public function (e.g. government), and by virtue of their position and the influence that they may hold, may present a higher risk for potential involvement in corrupt activity. We therefore consider at least a statement suggesting the intention to screen for PEPs as a positive indication of compliance. We therefore award **1 point** for this.

PEP Screening Statement	Points
FOUND	1
NOT FOUND	0

3.J Chief Compliance Officer

The compliance officer serves an important function in any cryptocurrency exchange, and helps to ensure that any relevant laws are complied with.

We assume that exchanges with an in-house compliance capacity driven by a chief compliance officer will be more capable of ensuring compliance with regulations and other local laws.

We therefore award **1 point** if we are able to successfully find the relevant staff member.

If this staff member is found, we also attempt to gauge their competence based on the number of years in compliance or legal roles. We award 1 point for 0-2 years, 2 points for 2-5 years, 3 points for 5-10 years and 4 points for more than 10 years.

Chief Compliance Officer	Points
FOUND	1
NOT FOUND	0

Professional Experience	Points
Years = 0	0
0 < Years≤ 2	1
2 < Years≤ 5	2
5 < Years≤ 10	3
Years>10	4

4. KYC/Transaction Risk

This category provides an indication of the stringency and effectiveness of KYC procedures, as well as the degree to which exchanges interact with higher risk entities using CipherTrace's proprietary interaction risk score. An exchange must also be able to detect and monitor suspicious trading activity; we gauge this based on a trade surveillance score.

The 5 metrics used in this category are summarised as follows:

A. Strict KYC/AML Procedures
B. On-chain transaction monitoring
C. CipherTrace KYC Risk Score
D. CipherTrace Interaction Risk Score
E. Trade Surveillance

About CipherTrace

CipherTrace's anti-money laundering, blockchain analytics, and risk management solutions are powered by advanced cryptocurrency intelligence. Leading exchanges, banks, digital asset businesses, and regulators use CipherTrace to comply with regulation, monitor compliance, and mitigate virtual asset compliance risks

4.A Strict KYC/AML

As part of most anti-money laundering regulations, it is important that exchanges **identify users** before they are able to trade.

Many exchanges now implement **strict Know Your Customer (KYC) policies** as a means of verifying identity - such that any illicit activity can be monitored and tracked effectively.

As part of our ranking system, exchanges that require identification verification via photo ID before trading is enabled are awarded 5 points, while those that do not are awarded 0 points.

Data collection is based predominantly on terms and conditions pages of various exchanges. If no policy can be found from these pages, the exchange is assumed to implement a policy that does not require identity verification to trade.

Requires Proof of ID to Trade	Points
YES	5
NO	0

4.B On-chain Transaction Monitoring

On-chain transaction monitoring refers to the process of collecting, tracking and analysing transactional flows between cryptoasset addresses on various blockchains.

One of the key functions of on-chain transactional monitoring is to identify and flag any suspicious flows of crypto that may have been derived from illicit sources.

This is an critical component if a crypto exchange wishes to reduce the chances that any funds flowing to or from the exchange are illicit. By to implementing a risk based AML compliance as prescribed by the Financial Action Task Force, EU AMLD5 and US Bank Secrecy Act exchanges can avoid regulatory exposure and potential enforcement actions.

Given the above, we award exchanges that conduct on-chain transaction via an external provider such as Chainalysis, Elliptic or CipherTrace with **4 points.** Certain exchanges may have an internal transaction monitoring system to some extent. We award this **2 points.**

CIPHERTRACE

Chainalysis

ELLIPTIC

Formal Trade Surveillance Provision	Points
YES - EXTERNAL	4
YES - INTERNAL	2
NO	0

4.C Trade Surveillance

Several high profile exchanges have employed the services of **third party trade surveillance providers** to monitor and flag any **suspicious trading activity**. Examples of these providers include Irisium Market Surveillance, Nasdaq SMARTS, Solidus Labs, and NICE Actimize.

In the current exchange ranking model, we make the assumption that exchanges that engage with a formal external market surveillance provider are more **transparent** and able to **detect** and **report** any illicit trading activity, and are therefore of **higher quality in terms of trade monitoring**.

There are exchanges that implemented their own “internal” trade monitoring systems. Given that this process is not conducted as independently, we assume that it is less indicative of quality than a formal system that is independently administered by a known surveillance provider.

For these reasons, we award 5 points to exchanges that implement external formal trade surveillance provision, and 2.5 points to those that have formally stated the use of their own internal monitoring systems. Exchanges that do not explicitly mention any formal trade monitoring system are awarded 0 points.

Formal Trade Surveillance Provision	Points
YES - EXTERNAL	5
YES - INTERNAL	2.5
NO	0

4.D CipherTrace KYC Classification Score

Our ranking awards points to exchanges according to **CipherTrace's VASP KYC classification** for cryptocurrency exchanges. Our ranking translates CipherTrace's three-tiered colour system for exchanges into points.

CipherTrace's global team of compliance experts have opened and actively trade on accounts with over 600 Virtual Asset Service Providers to determine their KYC risk level. They evaluate which exchanges require a very strenuous KYC process, requiring little or no KYC at thresholds and flags that have weak KYC.

A **Green** rating means that a very strenuous amount of KYC is required. ID process and proof of address are required, TAX ID number may be required and a phone call or video chat may be required. We award **4 points for a Green rated exchange.**

A **Yellow** rating means that an exchange will allow deposits and withdrawals up to a specified dollar amount with little to no KYC. CipherTrace deems this risky because structuring and account proliferation can allow money laundering to fly under the radar. Larger amounts may require up to a green level of KYC. **We award 2 points for a Yellow rated exchange.**

A **Red** rating means an exchange allows any daily deposit or withdrawal with very minimal to no KYC Usually this involves just an email address, name and perhaps a phone number (which may or may not be real). **We award 0 points for a Red rated exchange.**

Ratings are based on data for June 2020.

CipherTrace Classification	Points
Green	4
Yellow	2
Red	0

CIPHERTRACE

4.E CipherTrace Interaction Risk Score

Our ranking also awards points to exchanges according to CipherTrace's Interaction Risk Score. CipherTrace profiles VASP transactional risk by deanonymizing risky entities and illicit activities to identify criminal sources of funds and money laundering exposure.

This score classifies exchanges according to the percentage of its transactions which are conducted with entities deemed high risk. These are entities which are:

- Criminal
- Dark Market
- Dark Vendor
- Gambling
- High Risk Exchange
- Malware
- Mixer
- Ransomware
- OFAC Sanctioned Addresses

Accordingly, an exchange where **0-10%** of its transactions are conducted with high risk entities, **is awarded 4 points.** An exchange where **10-25%** of its transactions are conducted with high risk entities **is awarded 2 points,** and an exchange where more than **25% of** its transactions are conducted with high risk entities is awarded **0 points.**

Ratings are based on data for June 2020.

CipherTrace Classification	Points
0-10%	4
10-25%	2
>25%	0

5. Executive Management & Company Quality

The **calibre of the executive management team** and their level of **transparency** can be a clear proxy for how well an exchange is managed and accountable to any problems. Furthermore, the **age of an exchange** can provide us with a second gauge of infrastructure quality based on the assumption that older exchanges may have had the time to develop a more robust technical and legal infrastructure.

The first two metrics relate to **identity/transparency**, while the subsequent three metrics relate to **team/exchange quality**:

A. Identity of Executive Team
B. Post-Graduate/Professional Degrees
C. Professional Experience
D. Exchange Age
E. Investment

The assumption here is that the **more transparent** and **experienced/educated** an exchange's executive team, and the **older** an exchange is, the **higher the quality** of the exchange.

Finally, in order to expand and develop, many cryptocurrency exchanges have attracted **investments** from large well-known venture capital firms or prominent technology companies. We assume that the calibre of an investor can provide us with an indication of the quality of the exchange.

5.A-D Identity of Executive Team, Executive Quality and Exchange Age

A. Identity of Executive Team. The identity of the CEO, CTO, COO, CFO, CCO and CISO is registered in our data set. If no such title is available, the closest match is noted (e.g. VP of Engineering vs CTO). Those responsible for each position are searched for via company pages and LinkedIn. Each Identity that is found will receive 2 points. Those that cannot be found receive 0 points. The maximum points available is therefore 12 points (6 x 2).

B. Post-Graduate/Professional Degrees. As a measure of executive quality for each position, those that have attained either a masters-level degree or an additional professional qualification (e.g. CFA) will receive 1 point. Those that have not, will receive 0 points.

C. Professional Experience. This metric assumes that executives with more experience will be better at their respective roles. For the CEO, we gauge the number of years of experience at manager/director to C-level. For the CTO we gauge the number of years of experience in software related roles. For the CFO/COO we measure the number of years of experience in financial/operational roles respectively. For the chief compliance officer, we measure the number of years in legal or compliance roles. Finally for the CISO, we judge based on the number of years of relevant security/software/IT experience. Points are scored using a threshold system.

D. Exchange Age. The number of years of operation since launch can provide us with a measure of infrastructure quality based on the assumption that older exchanges may have had the time to develop a more robust technical and legal infrastructure. Ages are measured in years and scored using a tiered system. Older exchanges are scored higher than younger exchanges.

Identity of Exec Member (CEO/CTO/CFO/COO/CCO/CISO)	Points
Found	2
Not Found	0

Post-Graduate/Professional Degree	Points
YES	1
NO	0

Professional Experience	Points
Years = 0	0
0 < Years≤ 2	1
2 < Years≤ 5	2
5 < Years≤ 10	3
Years>10	4

Exchange Age	Points
Years ≤ 1	1
1<Years ≤ 3	4
3 < Years≤ 5	5
5 < Years≤ 7	7
Years>7	10

5F. Investment

In order to expand and develop, many cryptocurrency exchanges have attracted investments from large well-known venture capital firms or prominent technology companies.

We assume that the **calibre of an investor** can provide us with an indication of the quality of the exchange in three ways.

1. High quality investment banks, tech companies or professional VC firms invest in firms that meet a certain standards.
2. VC firms might invest in companies based on a selection of conditions or milestones that must be met moving forward. As a result, exchanges may be required to operate to a certain standard in order to meet these conditions. Effectively, high quality investors might impose their quality standards on exchanges that they invest in.
3. Finally, exchanges that receive investments from prominent investors have larger sums of capital with which to improve their operational and legal standards.

Large Institutional/Professional VC/Prominent Tech Investment. We only award points based on investments from investors that have been operating for a minimum of 5 years and predominantly invest in non-crypto related industries. Exchanges that have received investments from these types of investors are awarded 3 points.

Smaller High Quality Investors. Similar to the above, exchanges that have received investments from smaller well-known investors (VC/tech companies) are awarded 1 point.

For each investment category, if no investors could be found, they recieve zero points.

High Quality Investment Large Investor	Points
YES	3
NO	0

High Quality Investment Smaller Investor(s)	Points
YES	1
NO	0

6. Data Provision

This section assesses the quality of the API of an exchange. The following metrics were collected:

A. API Average Response Time (ms)
B. Ability to Query Historical Trades
C. Historical Candlestick Data
D. Granularity of Candlestick Data
E. Offers Websocket or FIX Connection
F. Provides Order Book API Endpoint
G. Maximum Order Book Level Offered
H. API Rate Limits

6.A/B Average API Response Time, Ability to Query Historical Trades

A. API Response Time: Defined as the average time taken for a user requesting order book data from an exchange's public REST API endpoint to fully receive the requested data end to end. This was designed to measure the efficiency of an exchange's infrastructure.

We measure this across all available exchange markets in 10 minute intervals between 01 June - 30 June 2020 where possible.

For high frequency traders, this metric is particularly important as it is critical to the ability react to new market information swiftly and to place orders at low latency.

The **lower** the average response time, the **better the rating**. This metric was scored using the basic threshold system on the right.

Threshold	Points
0 < Time ≤ 150	5
150 < Time ≤ 400	4
400 < Time ≤ 700	3
700 < Time ≤ 1000	2
1000 < Time ≤ 2000	1
2000 <Time	0

B. Ability to Query Historical Trades: refers to whether an exchange offers any public API endpoints that allow users to query for historical trades at any point in the past.

This is an important metric in terms of transparency and accountability as it allows users or authorities to cross-check any calculated values at certain points in time.

Ratings were assigned based based on a YES or NO response. Exchanges that offer the ability to query historical trades were awarded 5 points, while those that do not were awarded 0.

Ability to Query Historical Trades	Points
YES	5
NO	0

6.C/D Historical Candlestick Data

C. Does the exchange offer historical candlestick data?

While not as transparent as providing access to full historical trade data, the provision of historical candlestick data allows for the querying of the historical OHLC data via an API at some level of granularity.

Ratings were assigned based based on a YES or NO response. Exchanges that offer historical candlestick data were awarded 2 points, while those that do not were awarded 0.

D. What is the most granular level of data that can be queried?

We assume that the more granular the data, the more transparent the exchange, and more competent in terms of data provision. We award 2 points for 1 minute data or less and 1 point for between 1 minute and hourly.

Candlestick Response	Points
YES	1
NO	0

Granularity	Points
1 Min or Less	2
Between 1 Min - Hourly	1
More than Hourly	0

6.E Websocket or FIX Connection

Websocket Connection (WS): A websocket connection provides a standardized way for an exchange server to send data to a user without being first requested by the client (i.e. REST API).

Instead of a client requesting data from an exchange via an API, a user can maintain an open connection that "listens" for data, allowing a stream of data to pass back and forth between the user and the exchange. Websockets are capable of much larger quantities of data transfer and at higher rates than REST APIs.

Ratings were assigned based based on YES or NO response. Exchanges that offer a WS connection are awarded 5 points, while those that do not are awarded 0.

FIX Connection

FIX, or Financial Information eXchange is an electronic communications protocol used to exchange securities transaction information. Used by over 300 firms including the major investment banks, it has become the international standard for trade communication and regulatory reporting. This type of connection is similar to a websocket connection.

We consider an exchange that offers FIX to be of higher quality as it demonstrates a superior infrastructure and better integration with existing institutional protocols. We award 5 points for those that offer FIX.

Offers FIX or Websocket?	Points
YES	5
NO	0

6.F/G Order Book API Endpoint

F. Order Book: An order book contains a list of orders that an exchange uses to record the interests of buyers and sellers. A matching engine uses the order book to determine which orders can be filled.

The provision of an order book API endpoint provides users with the ability to gauge current order book depth, likely pricing consequences and risk of placing a market order at a given time, as well as signs as to where the price might move next. Exchanges that do not offer this endpoint effectively, hide important information regarding the characteristics of a market and how this changes over time.

Ratings were assigned based based on YES or NO response. Exchanges that offer an order book endpoint were awarded 1 point, while those that do not were awarded 0.

G. Maximum Order Book Level Offered

Providing granular order book data is both an indication of data transparency and technical competence. Level 1 order books refer to just the best bid and ask. Level 2 refers the aggregate orders at each bid and ask position. Level 3 refers to a fully granular order book with non-aggregated positions.

Order Book Endpoint Offered?	Points
YES	1
NO	0

Maximum Order Book Level Available	Points
Level 1	0
Level 2	1.5
Level 3	3

6.H API Rate Limits

H. API Rate Limits

Exchanges make their data public via an API (Application Programming Interface). Users are able to query data using various API endpoints.

Exchanges will vary in terms of the amount of **data requests per minute** (times a users can query data) they offer publicly to users. If a user exceeds the allocated rate limit (number of maximum requests per API endpoint), they will be unable to access data via the API.

In terms of data provision, exchanges that offer **higher rate limits** per minute are given a **higher score** than those that offer lower rate limits. We award 1 point for between 0 and 100 minutes, 2 points for between 100 and 400 minutes, 3 points for between 400 and 700 minutes, 4 points for between 700 and 1000 minutes, and 5 points for more than 1000 minutes.

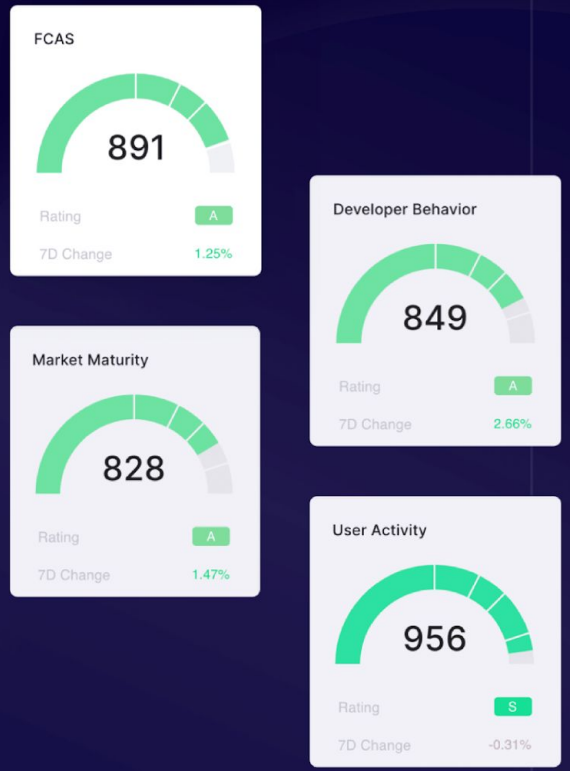
Threshold (minutes)	Points
0 < Rate Limit ≤ 100	1
100 < Rate Limit≤ 400	2
400 < Rate Limit≤ 700	3
700 < Rate Limit≤ 1000	4
Rate Limit>1000	5

flipsidecrypto

Proud to have FCAS as a core component of CryptoCompare's Exchange Benchmark

The Fundamental Crypto Asset Score (FCAS™) is a comparative metric used to assess the fundamental health of crypto projects. In this report it is being used to rate cryptocurrency exchanges based on the average score of the coins they offer.

Flipsidecrypto.com →



7. Asset Quality/Diversity

A. Asset Quality

This category provides an indication of both the **quality of the assets** listed on the exchange in collaboration with Flipside Crypto. Here we assume that an exchange that provides higher quality assets in general, will pose less of a threat to prospective investors.

The Fundamental Crypto Asset Score (FCAS™) is a comparative metric used to assess the fundamental health of crypto projects. Each asset is given a score, 0-1000, and an associated letter grade. The score is comprised of three major factors: user activity, developer behavior, and market maturity. Together, they provide a framework to assess an asset's potential for growth.

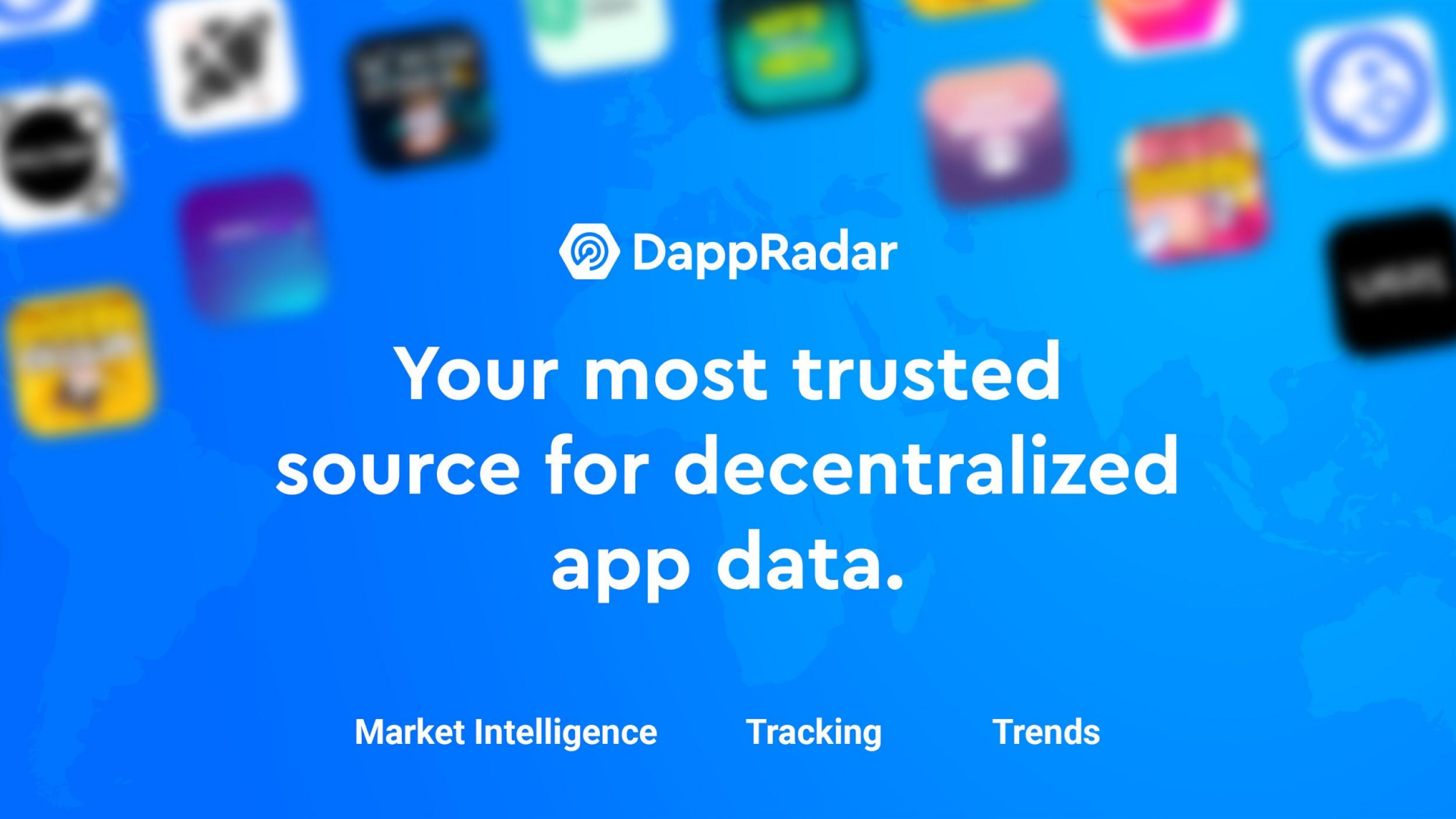
We rate an exchange on the basis of asset quality, and we calculate the average Flipside Crypto Asset Score (FCAS) of all coins offered on the exchange. We then convert this average FCAS score into points using a threshold system.

B. Asset Diversity

We also combine this score with an **asset diversity score**, which rates an exchange based on the quantity of assets available. The logic is that a greater number of assets allows an investor to diversify their holdings without needing to spread funds across various exchanges.

Threshold (Average FCAS Score)	Points
>750	5
650 - 750	4
550 - 650	3
450 - 550	2
350 - 450	1
<350	0

Threshold (# of Assets)	Points
>80	5
>30 - 80	4
>15 - 30	3
>5 - 15	2
>1-5	1
1	0


DappRadar
Your most trusted source for decentralized app data.
Market Intelligence
Tracking
Trends

DEX Ranking Components

Our DEX methodology (excluding market quality) comprises the following refined ranking components:

1. Security
2. Team/Exchange
3. Data Provision
4. Engagement
5. Asset Quality/Diversity
6. Legal
7. Negative Events Penalty

For DEX Market Quality Components, please see Appendix B - Market Quality Methodology.

DEX Ranking Components - Security

Decentralised exchanges differ from centralised exchanges in that they do not maintain custody of users funds in the same way. Given the decentralised nature of DEXs in terms of location, personnel, information etc, possession of security certifications such as ISO27001 would be an unfair means of assessing a DEX. We have therefore removed certain fields from the security category to make scoring more fair. As a result, we are left with 5 metrics of evaluation:

1. **SSL Rating.** Measured using the grading system from Qualys SSL Labs, which grades websites' SSL (Secure Sockets Layer) protocol. This is scored exactly the same as for centralised exchanges.

2. **White Hat Bounty Program.** DEXs often solicit the services of "white hat" hackers, or ethical hackers that are rewarded to find logic holes in the protocol that can be exploited. The presence of this program increases the chance that bugs are found before they are exploited. This therefore leads to a more secure DEX.

3. **2FA.** The presence of two factor authentication ensures that individual user accounts are less likely to become compromised by hackers.

4. **Number of Hacks (within 2 years).** Here, a hack refers to logic hole in the protocol that a hacker has exploited. If this has occurred more than twice in the last two years, the exchange is penalised 1 point.

5. **Any Recent Hacks (within 1 year).** Here a logic hole in the protocol that has been exploited by hackers within the last year is penalised 3 points.

SSL Rating	Security Points
A+	3
A	2.5
A-	2
B+	1
B	1
B- and below	0

White Hat Bounty Program	Security Points
YES	5
NOT FOUND	0

2FA	Security Points
YES	2
NOT FOUND	0

No. of hacks in 2 years	Security Points
MORE THAN 1	-1
NONE	0

Has been hacked in the last year	Security Points
YES	-3
NO	0

DEX Ranking Components - Team/Exchange

We acknowledge that it is common for the creators or operators of decentralised exchanges to maintain anonymity as a principle in line with that of blockchain technology and trustless networks in general. However, when it comes to assessing the risk of DEXs, we feel that it is necessary to at least understand who runs the exchange and what their competencies are.

Unlike centralised exchanges, DEXs have far fewer team members and often don't require the management teams required to operate large custodial exchanges effectively. We have therefore reduced the team members we assess to the CEO and CTO. We award points in the same way as our centralised exchange methodology.

Identity of CEO, CTO,
Education - Masters Degree/Formal Post-Graduate Certification
Experience in years
Exchange Age Since Launch

Identity of Exec Member (CEO/CTO)	Points
Found	2
Not Found	0

Post-Graduate/Professional Degree	Points
YES	1
NO	0

Professional Experience	Points
Years = 0	0
0 < Years≤ 2	1
2 < Years≤ 5	2
5 < Years≤ 10	3
Years>10	4

Exchange Age	Points
Years ≤ 1	1
1<Years ≤ 3	4
3 < Years≤ 5	5
5 < Years≤ 7	7
Years>7	10

DEX Ranking Components - Data Provision

In terms of data provision, DEXs are often more transparent given the fact that any transactions are usually broadcasted on the blockchains on which they operate. However, certain APIs supplied by DEXs are more comprehensive or easier to use than others. For this reason we have maintained the existing methodology to gauge a DEX's quality of data provision. We also acknowledge that certain DEXs may not offer the same traditional order book that many centralised exchanges do. For this reason we have also taken into account endpoints that are similar in function to those of an order book endpoint. We have scored this section in exactly the same way as we have done with centralised exchanges. Please see Slide 32: Data Provision for a more detailed breakdown and explanation of each metric.

1. **API Average Response Time (ms) -** [Scored 1-5]
2. **Ability to Query Historical Trades** [Scored 0 or 5]
3. **Historical Candlestick Data** [Scored 0 or 1]
4. **Granularity of Candlestick Data** [Scored 0 -2]
5. **Offers Websocket Connection** [Scored 0 or 5]
6. **Provides Order Book API Endpoint (or equivalent)** [Scored 0 or 1]
7. **Maximum Order Book Level Offered (or equivalent)** [Scored 0-3]
8. **API Rate Limits** [Scored 0-5]

DEX Ranking Components - Engagement

A new category that we have created specifically for DEXs is “Engagement”. This provides an indication of the size community of users on the platform as well as how active this community is on the dex in terms of the transactions they make. The assumption here is that the larger the engagement on a platform, the larger the liquidity pool is, and therefore the more “organic” the trading behaviour is on the platform. We believe that this leads to an overall higher quality platform that poses lower risk to prospective traders.

Where possible we have sourced these metrics from **DappRadar**, a data acquisition and analysis company that tracks over 3,500 decentralized applications (dapps), including exchanges, across multiple blockchains. If information is unavailable, we resort to individual DEX statistics pages for any information.

1. **# Users.** This metric is defined as the number of unique wallet addresses that have interacted with the dapp’s smart contracts in a given time frame. It is scored using a threshold system, with points awarded between 0 and 5.

2. **# Transactions/day.** This metric refers to the number of transactions that occur on the platform within a 24 hour period. This metric is scored using a threshold system with points awarded between 0 and 5.

DappRadar

# Users	Points
Users≤ 20	0
20<Users ≤ 100	1
100 < Users≤ 250	2
250 < Users≤ 500	3
500 < Users≤ 1000	4
Users>1000	5

# Transactions	Points
Transactions≤ 50	0
50<Transactions ≤ 250	1
250 < Transactions≤ 500	2
500 < Transactions≤ 2000	3
2000 < Transactions≤ 5000	4
Transactions>5000	5

DEX Ranking Components - Asset Quality/Diversity - Legal - Negative Events Penalty

Asset Quality/Diversity. Similar to centralised exchanges, we have rated DEXs on the basis of the quality of the assets they offer to users, as well as the quantity of assets offered. We derive our asset quality score based on the average FCAS score (provided by FlipsideCrypto) per exchange. Please see Slide 77: 7. Asset Quality/Diversity for more information.

a. **Average asset quality based on FCAS scores by FlipsideCrypto**
b. **Number of assets available on the platform**

Threshold (Average FCAS Score)	Points
>750	5
650 - 750	4
550 - 650	3
450 - 550	2
350 - 450	1
<350	0

Threshold (# of Assets)	Points
>80	5
>30 - 80	4
>15 - 30	3
>5 - 15	2
>1-5	1
1	0

Legal Entity. We understand that the teams behind decentralised exchanges often choose to remain anonymous in terms of the legal entity associated with them. This once again maintains the philosophical principles of trustless networks. Nonetheless, we believe that an exchange that is open and transparent in terms of their legal entity, is a sign that they are lower risk than those that choose to remain anonymous. We award 5 points to an exchange that openly displays their legal entity where applicable.

Legal Entity	Points
FOUND	5
NOT FOUND	0

Negative Events Penalty. This category is also present in the centralised exchange ranking, and refers to any substantially negative event that occurs on the exchange such as a fine in court, or other controversial event that has occured within the last year. We exclude hacks given that it is already penalised in the security category.

Negative Events	Points
FOUND	-5
NOT FOUND	0

Appendix B - Market Quality Methodology

Introduction

As part of providing an assessment of exchanges, it is important to also include a representative picture of what trading looks like on their markets.

The metrics defined here are designed to separate exchanges which behave differently from the average exchange. Metrics are converted into ranking scores which are aggregated into the total exchange ranking.

We first present common metrics often used to describe a market, followed by metrics which can be shown to isolate specific unusual trading behaviours.

1. Market Cost to Trade (spread)
2. Liquidity (depth)
3. Stability (volatility)
4. Behaviour Towards Market Movement - (volatility & volume correlation)
5. “Natural” Market Behaviour (standard deviation of volume)

Data Collection

Pairs	BTC-USD, BTC-USDT, BTC-ETH, BTC-KRW, BTC-JPY ETH-USD, ETH-USDT, and ETH-KRW, ETH-JPY and others.
Time Period	01 June - 30 June 2020
Trade Data	Transaction level data which provides insight into matches between two parties. It is used to calculate minute volatility and to measure an exchange's volume. Collection method: REST API polling on exchanges at exchange rate limits.
Order Book Data	Provides a view of all limit orders (offers to trade) on a particular market at any given moment. It is used to calculate spread and depth. Collection method: REST API polling snapshots and websocket connections when this was not possible.*

*CryptoCompare streams order books for the most notable exchanges via websocket connection; however, for the purposes of this report and to allow for the collection of the broadest data set possible we scaled out using the more widely available REST APIs.

Scoring Market Quality

Comparative

Used when a metric varies greatly between different markets, so we rank each exchange and market combination relative to its peers on a market by pair basis.

Following an ordered sort (direction is specific to each metric), a score of 0-10 is distributed across the group.

$$score(i) = \left\lfloor \frac{10i}{n} \right\rfloor \quad where\ i\ = position\ in\ the\ list$$

- Average spread
- 1% depth
- Minute volatility

Threshold

Used when a metric is completely market agnostic, so a threshold can be applied to fairly rank it across any market.

Pearson's correlation is one such measure where we can assign a fixed score to any given value.

- Volatility & volume correlation

Comparative + Threshold

Used when a metric varies greatly between different markets, but also when a logical threshold can be applied.

A threshold might be a fixed figure or one based on a group average or median.

- Standard deviation of trading volume

Each **exchange** receives an **aggregate score** based on an average of the markets we tested.

A Note on Aggregate Scoring

The pairs that were chosen for this report capture the majority of volume of crypto trading, and as such should give a fairly representative picture of exchanges.

A possible implication of focusing on just the specific markets considered in this report is that exchanges whose primary purpose is to cater to a specific jurisdiction (e.g. an exchange whose most liquid trading pairs are in GBP) may appear to have descriptive market metrics which under-represent the true liquidity on these exchanges. These exchanges will not, however, be penalised by other metrics unless the markets show particularly unusual trading behaviour.

1.a Market Cost to Trade - Average Spread

Spread is the difference between the best bid (the highest price at which someone is willing to buy) and the best ask (the lowest price at which someone is willing to sell).

Spreads are tight when markets are liquid. While they may widen in times of volatile price movements, the average spread gives an idea of the liquidity of the market, and quantifies how risky market makers believe the exchange is.

Higher spreads make it costlier to trade and increase market friction.

$$spread = \mathbb{E}(ask - bid)$$

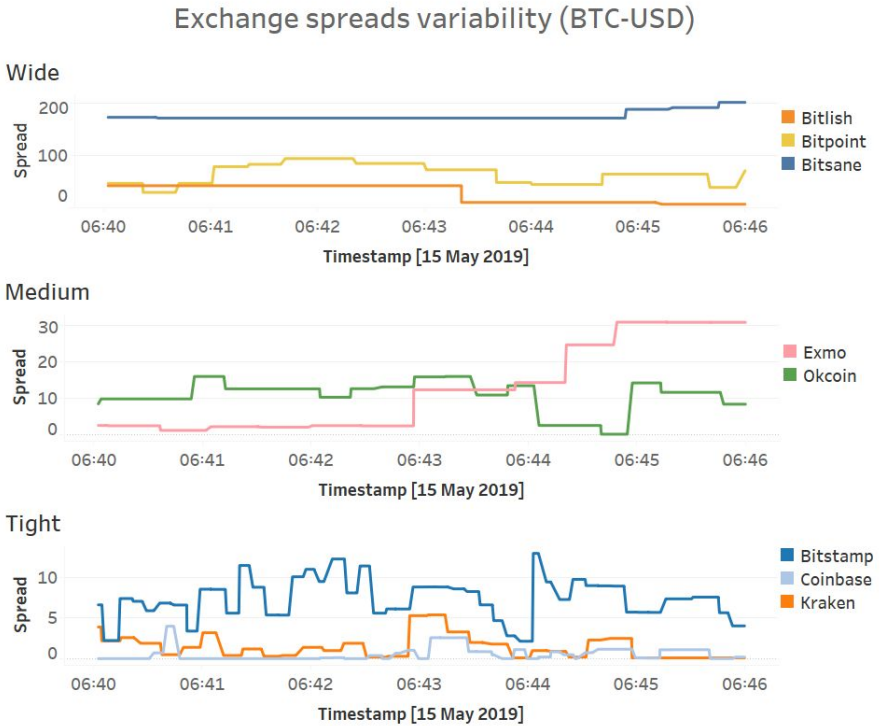
Bid and ask values were collected every 5 seconds (subject to exchange rate limiting) and averaged across Oct 5th to Nov 5th. The long time period used for data collection was chosen to allow for accurate average spread values to be estimated even in the presence of API downtime and differing rate limits.

1.b Spread Overview

Generally, those exchanges which offer incentives to provide liquidity through either low or negative maker fees will achieve the tightest spreads.

Due to the spread being calculated using the best bid and offer, it is misleading to use it as a sole gauge of liquidity and therefore as the market cost to trade; it must be used in conjunction with a depth measurement to find the likely transaction price for any given size of transaction.

The spreads on some notable exchanges are shown on the right hand chart to display their variability even on relatively short time horizons (5 mins).



1.c Scoring Average Spread

Define metric | Score across each market | Aggregate

Higher spread = Lower score
Lower spread = Higher score

Comparative

We rank each exchange and market combination relative to its peers on a market by pair basis.

Following an ordered sort (direction is specific to each metric), a score of 0-10 is distributed across the group.

$$score(i) = \left\lfloor \frac{10i}{n} \right\rfloor \quad where\ i\ = position\ in\ the\ list$$

Exchange	Market	Metric	Metric Score
Exchange A	BTC-USD	40	0
Exchange B	BTC-USD	28	0
Exchange C	BTC-USD	20	1
Exchange D	BTC-USD	15	1
Exchange E	BTC-USD	12	2
...	...	...	...
Exchange R	BTC-USD	3	8
Exchange S	BTC-USD	2.3	9
Exchange T	BTC-USD	1.5	9
Exchange U	BTC-USD	0.9	10
Exchange V	BTC-USD	0.8	10

Exchange	Markets	Aggregated Metric Score
Exchange B	BTC-USD ETH-USD ETH-BTC	8.4
Exchange C	ETH-USD ETH-KRW ETH-JPY	8.0
Exchange A	BTC-USD BTC-KRW ETH-BTC	6.5
Exchange D	BTC-JPY ETH-BTC	6.2
Exchange E	BTC-USDT ETH-USDT ETH-BTC	5.9

2.a Liquidity - Average 1% Depth

Market depth is the total volume of orders in the order book. It provides an idea of how much it is possible to trade on an exchange, and how much the price is likely to move if large amounts are traded.

An exchange with greater average depth is likely to be more stable (i.e flash crashes are much less likely) and allows trading of greater amounts at better prices.

We consider the depth up to 1% either side of the mid price.

$$depth = \mathbb{E}\left(\frac{depthUp + depthDown}{2}\right)$$

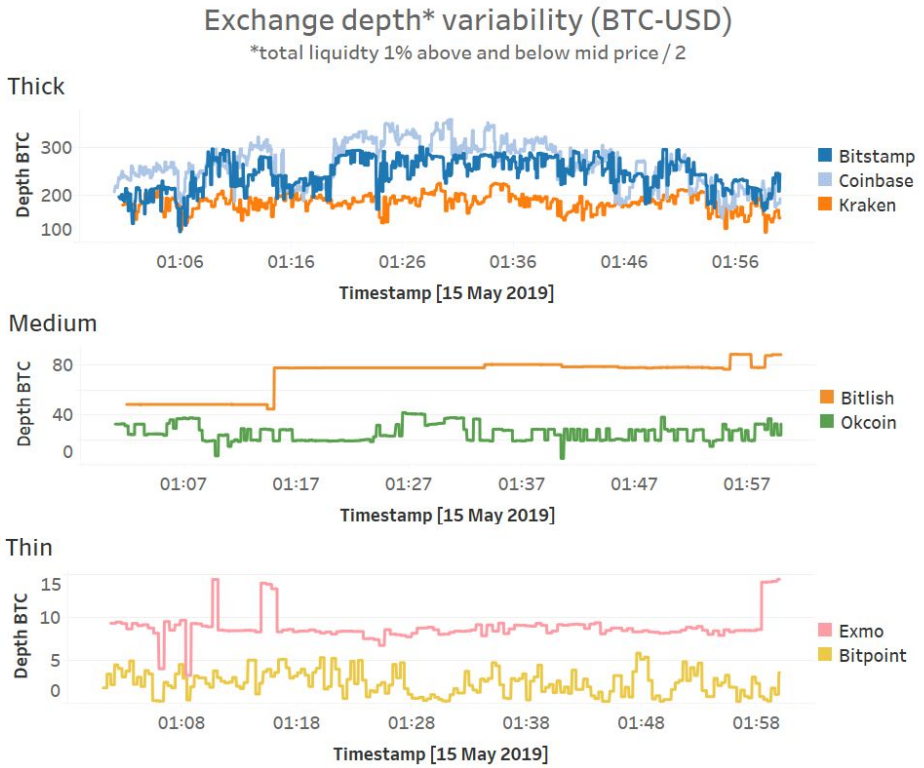
Where depthUp is the total volume that would be required to move the price by 1% upwards from the mid price, and depthDown is the total volume that would be required to move the price by 1% downwards from the mid price.

2.b Depth Overview

Generally, exchanges which offer incentives to provide liquidity, through either low or negative maker fees, will achieve the deepest order books.

Exchanges that attract the most trading activity will naturally have more orders resting on their book at larger sizes, increasing the depth.

There are stark differences in the depth between exchanges, as shown on the right hand chart. Depth tends to stay relatively constant throughout any given day, but news and other price impacting events can cause sharp changes.



2.c Scoring Average 1% Depth

Define metric | Score across each market | Aggregate

Less depth = Lower score
More depth = Higher score

Comparative

We rank each exchange and market combination relative to its peers on a market by pair basis.

Following an ordered sort (direction is specific to each metric), a score of 0-10 is distributed across the group.

$$score(i) = \left\lfloor \frac{10i}{n} \right\rfloor \quad where\ i\ = position\ in\ the\ list$$

Exchange	Market	Metric	Metric Score
Exchange A	BTC-USD	6	0
Exchange B	BTC-USD	12	0
Exchange C	BTC-USD	16	1
Exchange D	BTC-USD	56	1
Exchange E	BTC-USD	100	2
...	...	...	...
Exchange R	BTC-USD	500	8
Exchange S	BTC-USD	534	9
Exchange T	BTC-USD	611	9
Exchange U	BTC-USD	900	10
Exchange V	BTC-USD	1456	10

Exchange	Markets	Aggregated Metric Score
Exchange B	BTC-USD ETH-USD ETH-BTC	8.4
Exchange C	ETH-USD ETH-KRW ETH-JPY	8.0
Exchange A	BTC-USD BTC-KRW ETH-BTC	6.5
Exchange D	BTC-JPY ETH-BTC	6.2
Exchange E	BTC-USDT ETH-USDT ETH-BTC	5.9

3.a Stability - Minute Volatility

When trading the same asset across exchanges, it is preferable to have lower volatility. Measures of market risk such as the Sharpe ratio use the volatility of an asset.

As we would prefer lower risk when holding an asset on an exchange, we would also prefer lower volatility.

$$volatility = \sigma\left(\frac{price_t - price_{t-1}}{price_t}\right)$$

To calculate the metric, price is bucketed into minutes and the volatility is calculated using the close price of each minute bucket over a rolling 6H period. The volatility is then averaged over the full time period (Oct 5th - Nov 5th).

3.b Scoring Minute Volatility

Define metric | Score across each market | Aggregate

Higher volatility = Lower score
Lower volatility = Higher score

Comparative

We rank each exchange and market combination relative to its peers on a market by pair basis.

Following an ordered sort (direction is specific to each metric), a score of 0-10 is distributed across the group.

$$score(i) = \left\lfloor \frac{10i}{n} \right\rfloor \quad where\ i\ = position\ in\ the\ list$$

Exchange	Market	Metric	Metric Score
Exchange A	BTC-USD	0.3	0
Exchange B	BTC-USD	0.18	0
Exchange C	BTC-USD	0.12	1
Exchange D	BTC-USD	0.11	1
Exchange E	BTC-USD	0.10	2
...	...	...	...
Exchange R	BTC-USD	0.04	8
Exchange S	BTC-USD	0.03	9
Exchange T	BTC-USD	0.01	9
Exchange U	BTC-USD	0.009	10
Exchange V	BTC-USD	0.003	10

Exchange	Markets	Aggregated Metric Score
Exchange B	BTC-USD ETH-USD ETH-BTC	8.4
Exchange C	ETH-USD ETH-KRW ETH-JPY	8.0
Exchange A	BTC-USD BTC-KRW ETH-BTC	6.5
Exchange D	BTC-JPY ETH-BTC	6.2
Exchange E	BTC-USDT ETH-USDT ETH-BTC	5.9

4/5 Metrics to Identify Unusual Behaviour

Recent industry focus has centred around highlighting suspicious trading behaviour on exchanges. There has, however, been a shortage of clear and transparent methodologies published for ascertaining whether trading is suspicious for a given market.

We provide a summary of metrics deemed to give a good assessment of whether the trading on an exchange conforms to behaviour that one might generally expect to see. Each of these metrics are designed to single out specific types of trading behaviour.

Behaviour towards market movement - volatility & volume correlation

We analyse the correlation between volume and volatility and use this to provide insights into the types of market participants trading on exchanges, and consider how this differs from the aggregate average.

Natural trading behavior - standard deviation of trading volume

We analyse the standard deviation of trading volumes over different time periods and show that this metric can be used to separate two very different trading behaviours on an exchange.

4.a Behaviour Towards Market Movement

Volatility & volume correlation

The relationship between market volatility and volume can be used to glean an insight into the sorts of trading activity which are being carried out on an exchange.

To explain the modes of trading behaviour seen on exchanges, we define two types of market participants:

- Market makers operate on exchanges, and aim to make a profit while maintaining a market neutral position. They provide liquidity and narrow spreads on a market . Generally, they make money from payments from the exchange, through arbitrage, or on the bid-ask spread.

- Investors are defined here as traders who take a position in the market. They make money based on the price movements of the asset.

4.b An ‘Investor Market’

Investors who take a position in the market are likely to trade more actively in times of volatility.

Price movements may cause limit orders to be filled and new investors will likely join the market to react to price movements.

The end result of this is that volume is positively correlated with price volatility.

4.c A ‘Maker Market‘

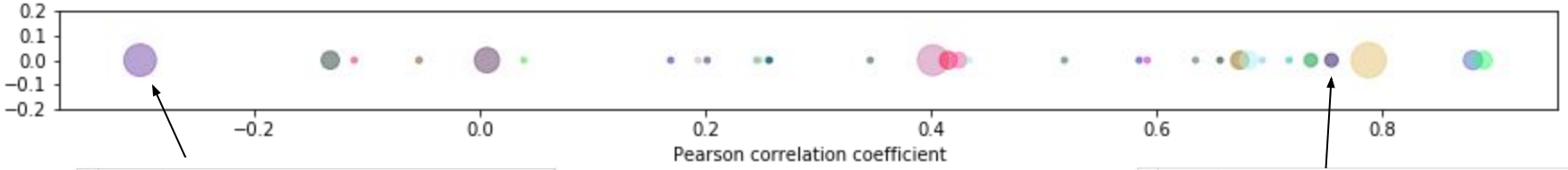
In times of high volatility it becomes less certain that market makers are able to hedge any trade they make effectively.

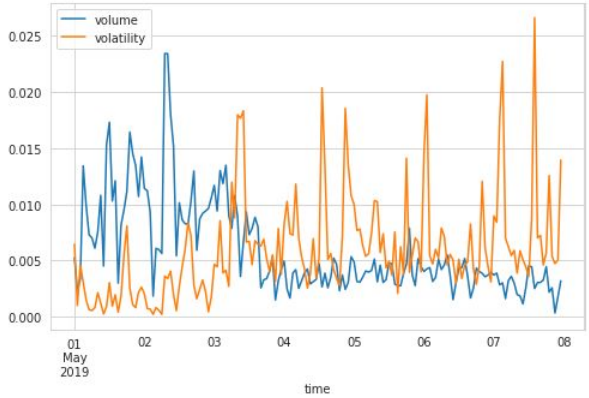
They therefore reduce volumes at each position or increase the spread they are willing to provide for the market. This makes the asset less liquid and means that smaller trades will cause larger price movements.

To avoid large slippage, traders therefore need to trade smaller amounts and the volume becomes negatively correlated to the volatility.

4.d Differentiating Between Types of Market

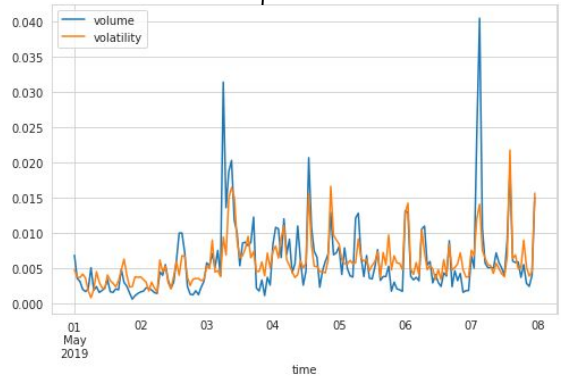
Taking the Pearson correlation coefficient between hourly trading volume and standard deviation of trade-on-trade return we can separate exchanges which operate with trading in each of these regimes. Size of the marker represents reported trading volume.



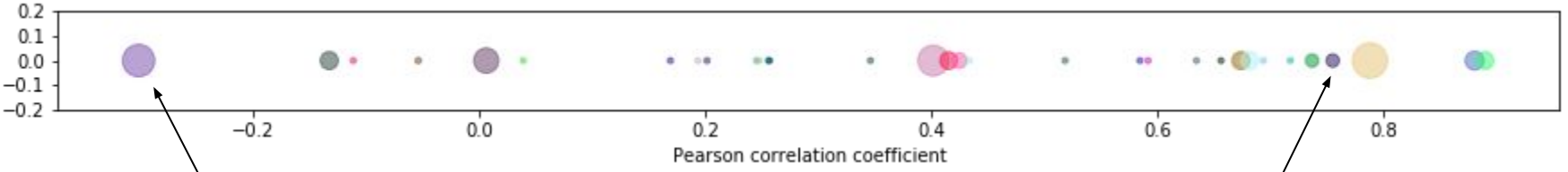


'Maker market'

'Investor market'



4.e Differentiating Between Types of Market



‘Maker market’

‘Investor market’

4.f The Market as a Whole

Both types of behaviour occur in traditional financial markets, but to define what we expect for a cryptocurrency market we turn to a market aggregate.

Here we use the CryptoCompare Index (CCCAGG) as an example of a wide market index. The volume can be seen to correlate with price movements. This is therefore considered to be the preferred behaviour for an exchange.

4.g Scoring Behaviour Towards Market Movement

Volatility & Volume Correlation

Define metric | Score across each market | Aggregate

Low or negative correlation = Lower score
High positive correlation = Higher score

Threshold

A correlation threshold can be applied to fairly rank it across any market.

Pearson's correlation is one such measure which we can assign a fixed score to any given value.

The table on the right sets out the thresholds for each score.

Correlation	Metric Score
<= 0	0
< 0.12	1
< 0.19	2
< 0.27	3
< 0.35	4
< 0.42	5
< 0.5	6
< 0.58	7
< 0.65	8
< 0.73	9
>= 0.73	10

Exchange	Markets	Aggregated Metric Score
Exchange B	BTC-USD ETH-USD ETH-BTC	8.4
Exchange C	ETH-USD ETH-KRW ETH-JPY	8.0
Exchange A	BTC-USD BTC-KRW ETH-BTC	6.5
Exchange D	BTC-JPY ETH-BTC	6.2
Exchange E	BTC-USDT ETH-USDT ETH-BTC	5.9

5.a Natural Trading Behavior

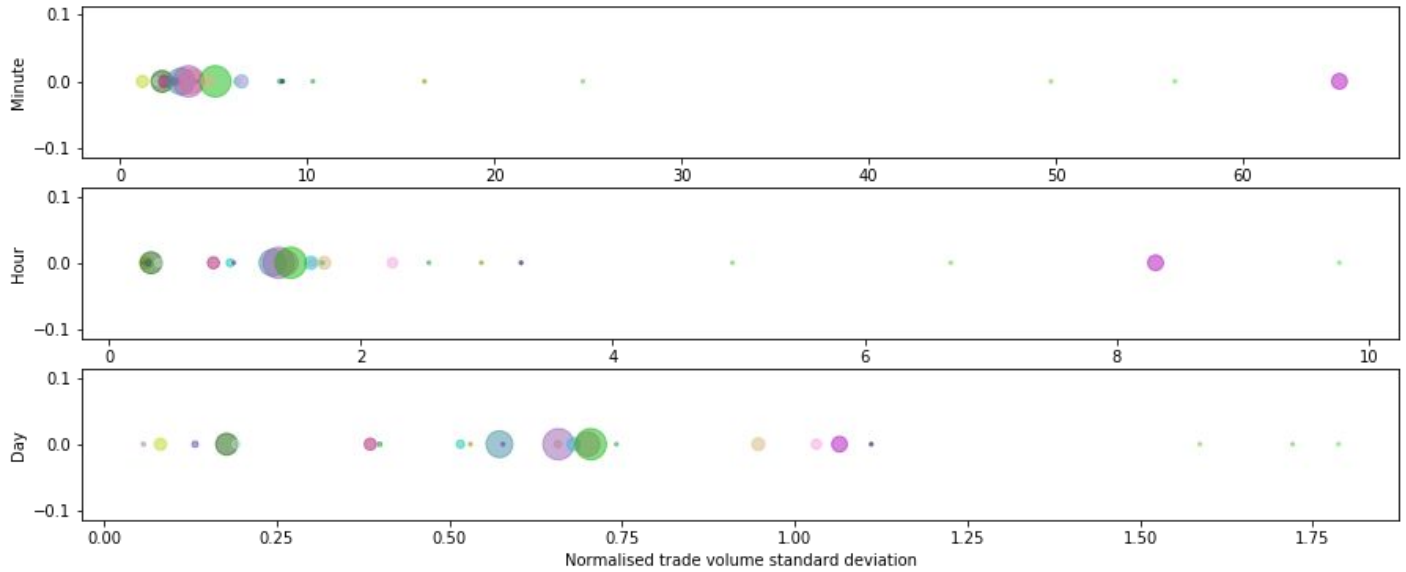
Standard deviation of trading volume

While, as previously discussed, we might expect price volatility to affect trading volume, it is unlikely that in a time of constant price volatility the trading volume would remain constant.

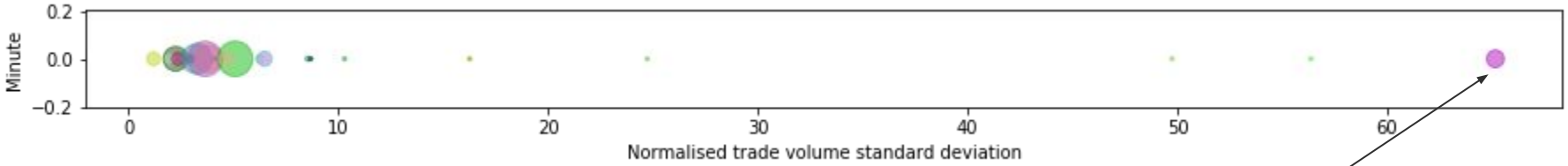
This behaviour is explored by considering how much the minutely, hourly and daily volume vary on average using the standard deviation.

5.b Varying the Time Period

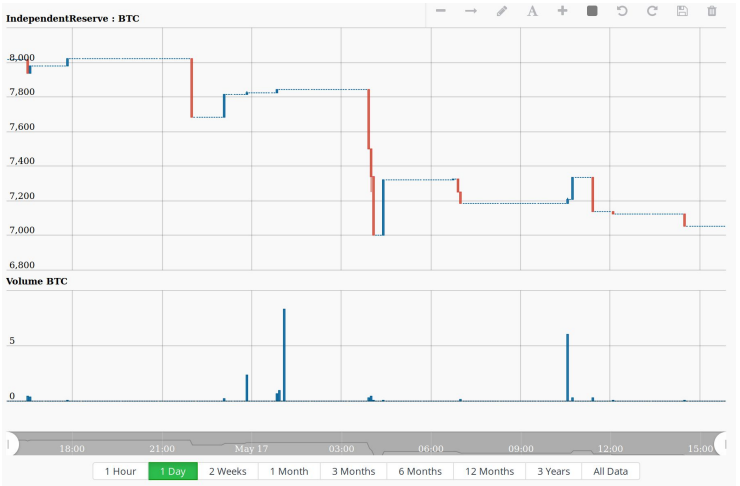
We take the standard deviation of the trading volume over different time periods, and normalise by the mean trading volume for the period.



5.c Small Time Periods

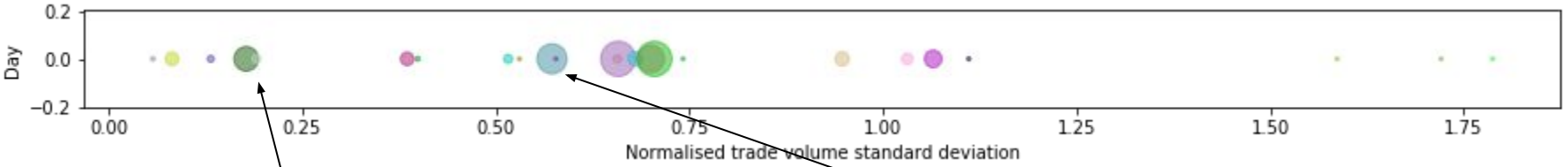


Outliers at small time periods are caused by exchanges which trade very infrequently.



5.d Long Time Periods

Groups at longer time periods (1 day volume) display clear demarcation of the target behaviour.



5.e Scoring Natural Trading Behavior

Standard deviation of trading volume

Define metric | Score across each market | Aggregate

Low standard deviation = Lower score
High standard deviation = Higher score

Comparative + Threshold

Following a ascending sort, a median standard deviation is determined.

Every constituent with a higher standard deviation than the median is given a score of 10.

With the remaining constituents, a score of 0-10 is distributed across the group.

Exchange	Market	Metric	Metric Score
Exchange A	BTC-USD	0.03	0
Exchange B	BTC-USD	0.09	1
Exchange C	BTC-USD	0.10	2
Exchange D	BTC-USD	0.13	3
...	...	...	...
Exchange K	BTC-USD	0.43	10
...	...	...	...
Exchange S	BTC-USD	0.71	10
Exchange T	BTC-USD	0.81	10
Exchange U	BTC-USD	0.85	10
Exchange V	BTC-USD	0.91	10

Exchange	Markets	Aggregated Metric Score
Exchange B	BTC-USD ETH-USD ETH-BTC	8.4
Exchange C	ETH-USD ETH-KRW ETH-JPY	8.0
Exchange A	BTC-USD BTC-KRW ETH-BTC	6.5
Exchange D	BTC-JPY ETH-BTC	6.2
Exchange E	BTC-USDT ETH-USDT ETH-BTC	5.9

DEX Market Quality Methodology

1. Average % Spread
   a. Given the diverse number of unique pairs in DEXs, average % spread is used instead of average spread to be more comparable.
   b. % spread is defined as the spread relative to the mid price; where mid price is the average between the best bid and the best ask.

$$mid = \frac{(ask - bid)}{2}$$

$$\%\ spread = \mathbb{E}\,\frac{(ask - bid)}{mid}$$

2. Average 1% Depth
   a. Depth provides an idea of how much the price is likely to move if large amounts are traded.
   b. Exchanges with greater average depth are more likely to be stable.

$$depth = \mathbb{E}\left(\frac{depthUp + depthDown}{2}\right)$$

3. Average Daily Traded Volume
   a. Traded volume gives an idea of the amount of activities on the exchange, as well as general liquidity.

$$volume = \frac{\sum Traded\ volume}{Days\ in\ observation\ period}$$

1. Scoring Average % Spread

Define metric → Top pairs for each exchange → Aggregate

Higher spread = Lower score
Lower spread = Higher score

Comparative

We rank each exchange by averaging its % spread across its top traded pairs, compared to its peers' top pairs.

Following an ordered sort (direction is specific to each metric), a score of 0-10 is distributed across the group.

$$score(i) = \left\lfloor \frac{10i}{n} \right\rfloor \quad where\ i\ = position\ in\ the\ list$$

Exchange	Market	Metric
Exchange A	ETH-DAI	0.8
Exchange A	BAT-ETH	12
Exchange A	SNX-ETH	20
Exchange B	KNC-ETH	2.3
Exchange B	LTC-BNB	40
...	...	...
Exchange D	BSV-USD	3
Exchange D	BTC-ETH	2.3
Exchange D	BNB-BTC	15
Exchange E	HEX-ETH	40
Exchange E	ETH-USDC	23

Exchange	Markets	Aggregated Metric Score
Exchange B	KNC-ETH LTC-USDC ETH-DAI	8.4
Exchange C	SNX-ETH ETH-DAI LTC-BNB	8.0
Exchange A	HEX-ETH ETH-USDC SNX-ETH	6.5
Exchange D	KNC-ETH BAT-ETH COMP-ETH	6.2
Exchange E	LINK-ETH UBT-PAX ETH-USDT	5.9

2. Scoring Average 1% Depth

Define metric | Top pairs for each exchange | Aggregate

Less depth = Lower score
More depth = Higher score

Comparative

We rank each exchange by averaging its 1% depth across its top traded pairs, compared to its peers' top pairs.

Following an ordered sort (direction is specific to each metric), a score of 0-10 is distributed across the group.

$$score(i) = \left\lfloor \frac{10i}{n} \right\rfloor \quad where\ i\ = position\ in\ the\ list$$

Exchange	Market	Metric
Exchange A	ETH-DAI	0.8
Exchange A	BAT-ETH	12
Exchange A	SNX-ETH	20
Exchange B	KNC-ETH	2.3
Exchange B	LTC-BNB	40
...	...	...
Exchange D	BSV-USD	3
Exchange D	BTC-ETH	2.3
Exchange D	BNB-BTC	15
Exchange E	HEX-ETH	40
Exchange E	ETH-USDC	23

Exchange	Markets	Aggregated Metric Score
Exchange B	KNC-ETH LTC-USDC ETH-DAI	8.4
Exchange C	SNX-ETH ETH-DAI LTC-BNB	8.0
Exchange A	HEX-ETH ETH-USDC SNX-ETH	6.5
Exchange D	KNC-ETH BAT-ETH COMP-ETH	6.2
Exchange E	LINK-ETH UBT-PAX ETH-USDT	5.9

3. Scoring Average Daily Traded Volume

Define metric | Top pairs for each exchange | Aggregate

Lower volume = Lower score
Higher volume = Higher score

Comparative

We rank each exchange by averaging its daily volume across its top traded pairs, compare to its peers' top pairs.

Following an ordered sort (direction is specific to each metric), a score of 0-10 is distributed across the group.

$$score(i) = \left\lfloor \frac{10i}{n} \right\rfloor \quad where\ i\ = position\ in\ the\ list$$

Exchange	Market	Metric
Exchange A	ETH-DAI	0.8
Exchange A	BAT-ETH	12
Exchange A	SNX-ETH	20
Exchange B	KNC-ETH	2.3
Exchange B	LTC-BNB	40
...	...	...
Exchange D	BSV-USD	3
Exchange D	BTC-ETH	2.3
Exchange D	BNB-BTC	15
Exchange E	HEX-ETH	40
Exchange E	ETH-USDC	23

Exchange	Markets	Aggregated Metric Score
Exchange B	KNC-ETH LTC-USDC ETH-DAI	8.4
Exchange C	SNX-ETH ETH-DAI LTC-BNB	8.0
Exchange A	HEX-ETH ETH-USDC SNX-ETH	6.5
Exchange D	KNC-ETH BAT-ETH COMP-ETH	6.2
Exchange E	LINK-ETH UBT-PAX ETH-USDT	5.9

Appendix C - Points and Grading Summary

Points Categories

A. Legal/Regulatory Assessment
B. KYC/Transaction Risk
C. Security
D. Team/Exchange
E. Data Provision
F. Asset Quality/Diversity
G. Market Quality
H. Negative Events (penalty factor)
I. Inflation Score (*not used in ranking)

Points Category A - Legal/Regulation

A. Legal/Regulation	Scoring
Legal Company Name	Found: **5**, Not Found:**0**
Registered as an MSB or Licensed as a CryptoCurrency Exchange	YES: **12** x **Compliance Stringency Factor [0-3]/3*** , NO: **0**
Geography Country Rating	Low Risk: **9**, Medium Risk: **6**, High Risk: **3**, Very High Risk: **0**
Country Regulation Rating	Crypto Exchange Regulation: **[0-3]**
Part of Self-Regulatory Organisation	YES: **2**, NO: **0**
Part of Industry Group	YES: **1**, NO: **0**
Fiat Insurance Against Losses	YES: **3**, NO: **0**
Crypto Insurance Against Losses OR	YES: **3**, NO: **0**
Self-Insurance Fund	YES: **1**, NO: **0**
CCO (Chief Compliance Officer)	Found: **1**, Not Found: **0**
CCO Experience (in Compliance or Legal Roles)	Years = 0: 0, **0** < Years< 2: **1** , 2 < Years< 5: **2** , 5 < Years< 10: **3** , Years>10: **4**
Sections Compliance Statement	YES: **1**, NO: **0**
PEP Statement	YES: **1**, NO: **0**
Total Legal/Regulatory Points	**0-54**
Re-Scaled Legal Points Available	**20%**

**See Compliance Stringency Methodology here for more information on scoring.*

Points Category B - KYC/Transaction Risk

A. Legal/Regulation	Scoring
Strict KYC/AML (proof of ID)	YES: **5**, NO: **0**
On-chain transaction monitoring	YES: **2**, NO: **0**
On-chain transaction monitoring - Internal of External Provider	INTERNAL: **0**, EXTERNAL: **2**
CipherTrace KYC Score	RED: **0**, YELLOW: **2**, GREEN: **4**
CipherTrace Interaction Risk Score	0<10%: 4, 10-25%: **2**, >25%: **4**
Market Surveillance System	YES: **2** NO: **0**
External/Internal (if YES to above)	External:**3** Internal: **0.5**
Total KYC/Transaction Risk Points	0-22
Re-Scaled Legal Points Available	**15**

Points Category C - Security

B. Security	Scoring
Formally Certified and Compliant with Security Industry Standard (E.g. ISO 27001, SOC2)	YES: **5**, NO: **0**
SSL Security Rating by Qualys or ImmuniWeb	A+ =**3**, A=**2.5**, A-=**2**, B+ or B=**1**, <B-=**0**
Offline Storage (Cold Wallet)	YES: **2,** NO: **0**
Cold Wallet %	**Cold Wallet % * 3 (weighting factor),** "Majority": **2,** "Some": **1,** Not Found: **0**
Geographical Key Distribution	YES: **2,** NO: **0**
2FA	YES: **2,** NO: **0**
Custody Provider (E.g Bitgo)	YES: **3,** NO: **0**
Number of Hacks in Last 2 Years	More than 1: **-3,** Less than 2: **0**
Hacked Recently	Yes: **-5**, No: **0**
Total Security Points	0-19
Re-Scaled Investments Points Available	**20**

Points Categories D - Investment and Team/Exchange

Team/Company/Investment	Scoring
CEO/CTO/CFO/COO/CCO/CISO *Repeat for each executive	Found:**2** Not Found: **0** *(12 Total Max)*
CEO/CTO/CFO/COO/CCO/CISO Masters or Postgraduate Certification *Repeat for each executive	YES:**1**, NO:**0** *(6 Total Max)*
CEO/CTO/CFO/COO/CCO/CISO *Repeat for each executive For CEO: director to c-level For CTO: software roles For CFO: financial/accounting roles COO: operations roles CCO: compliance/legal roles CISO: software roles	 Years = 0: **0** 0 < Years< 2: **1** 2 < Years< 5: **2** 5 < Years< 10: **3** Years>10: **4** *(24 Total Max)*
Exchange Age Since Launch	Months < 12: **1** 12<Months < 36: **3** 36 < Months< 60: **5** 60 < Months< 84: **7** Months>84: **10**
Funding by Large VC or Non-Crypto Established Company	YES: **3** NO: **0**
Funding by Smaller VC Companies	YES: **1** NO: **0**
Total Team/Exchange Points Available	**0-56**
Re-Scaled Team/Company Points Available	**15**

Points Category E - Data Provision

E. Data Provision	Scoring
API Average Response Time (ms)	0 < Time < 150: **5** 150 < Time < 400: **4** 400 < Time < 700: **3** 700 < Time < 1000: **2** 1000 < Time < 2000: **1** 2000 <Time: **0**
Ability to Query Historical Trades	YES:**5**, NO: 0
Historical Candlestick Data	YES:**1**, NO: **0**
Minimum Candlestick Data Granularity	=<1min = **2** 1min - 1hour: **1** >1hour**: 0**
Offers Websocket or FIX Connection	YES: **5**, NO: **0**
Provides Order Book API Endpoint	YES: **1**, NO: **0**
Maximum Order Book Level	L1=**0**, L2=**1.5**, L3=**3**
API Rate Limits	0 < Rate Limit < 100: **1** 100 < Rate Limit< 400: **2** 400 < Rate Limit< 700: **3** 700 < Rate Limit< 1000: **4** Rate Limit>1000: **5**
Total Data Provision Points Available	27
Re-Scaled Data Provision Points Available	**15**

Points Categories G/H/I - Market Quality, Inflation, Negative Events

A. Market Quality	Scoring	B. Inflation Score	Scoring	Negative Reports	Scoring
Market cost to trade (average spread)	0-10	Competitions	YES:5 NO: 0	Negative Reports Found	YES: -5 NO: 0
Liquidity (average depth of 1% price impact)	0-10	Airdrops	YES: 2.5 NO: 0	Total Negative News Points Deductible	-5
Stability (minute volatility)	0-10	Transaction Fee Mining	YES: 15 NO: 0		
Behaviour towards sentiment (volatility and volume correlation)	0-10	Margin Trading	YES: 5 NO: 0		
Natural trading behaviour (volume standard deviation)	0-10	No Fees	YES: 5 NO: 0		
Total Market Quality Points	0-50	Total Inflation Points	0- 32.5		
Re-Scaled Market Quality Points Available	**15**	**Re-Scaled Inflation Score Available**	**10**	**Re-Scaled Negative News Points**	**-5**

Points Aggregation and Grading

Scores from each category were aggregated to form a total cumulative score. The **maximum score is 100.**

Category	Maximum Points
Security	20
Legal	20
KYC/Transaction Risk	15
Management/Company	15
Data Provision	20
Asset Quality/Diversity	5
Market Quality	20
Total Cumulative Points Available	**100**

Threshold	Grade
Above 75	AA
65-75	A
55-65	BB
45-55	B
35-45	C
20-35	D
10-20	E
<10	F