CryptoCompare

EXCHANGE REVIEW JANUARY 2019

Abstract

CryptoCompare's Exchange Review aims to capture the key developments within the cryptocurrency exchange market, as well as any changes to the constituent exchanges that make up CryptoCompare's CCCAGG price indices. Our review focuses on analyses that relate to exchange volumes, and includes an analysis of the highest volume producing jurisdictions, as well as market segmentation by exchange fee model.

We also evaluate how spot volumes vs futures volumes have developed historically to date, including both crypto exchange (BitMEX and BitflyerFX) and traditional exchange (CBOE and CME) futures volumes. Finally, we conduct an analysis of bitcoin trading into various fiats and stablecoins, as well as an overview of how exchange web traffic has changed over the previous few months.

We provide an additional overview of top crypto exchange rankings by spot trading volume, as well as a focus on how volumes have developed historically for the top trans-fee mining and decentralised exchanges.

CryptoCompare's Exchange Review is conducted on a monthly basis and caters to both the crypto-enthusiast interested in a broad overview of the crypto exchange market, as well as investors, analysts and regulators interested in more specific analyses.

For questions related to our research or any potential requests, feel free to contact our research department at **research@cryptocompare.com**

For those interested in accessing CryptoCompare's data for their own purposes, whether it be cryptocurrency trade data, order book data, blockchain data, social data or historical data across thousands of cryptocurrencies and 200+ exchanges, please take a look at CryptoCompare's API here: **https://min-api.cryptocompare.com**

Contents

Executive Summary

Macro Analysis and Market Segmentation

1 **Country Analysis** - Maltese-registered exchanges represented the majority of trading volume, followed by those legally registered in Hong Kong and Samoa. Monthly trading volume from Maltese-registered exchanges dropped 17% since December, while that of Hong Kong and Samoa-registered exchanges decreased by 5.5% and increased by 9% respectively.

2 **Predominant Fee Type** - Exchanges that charge taker fees represented 84% of total exchange volume in January, while those that implement trans-fee mining (TFM) represent 15%. Fee-charging exchanges traded a total of 141 billion USD in January, while those that implement TFM traded 25 billion USD. The remaining volume represented trading by exchanges that charge no trading fees, totalling 2.8 billion USD.

3 **Futures Trading** – The proportion of futures trading volume decreased from 28% in December to 24% in January. bitFlyerFX traded the highest amount of BTC futures volume in January with a daily average transactional value of 1.13 billion USD (down 23% since December), followed by BitMEX perpetual futures at 665 million USD (down 41% since December). Futures products from traditional regulated exchanges (CME and CBOE) represented 11.7% of the Bitcoin to USD futures market in January, up from 6.36% in December.

4 **Fiat Capabilities** – Monthly trading volume from exchanges that offer fiat pairs decreased by 26.5% in January to 37.5 billion USD, while crypto to crypto exchange volume decreased by 7.2% to 132 billion USD. Following this large decline in volume from exchanges that offer fiat trading pairs, in January they represented 22% of total spot volume, down from 26% in December.

5 **Web Traffic** - Total exchange web traffic continues its downward trend along with spot volumes, each dropping 13.5% and 12.4% respectively in January. According to calculations based on Alexa data, total monthly unique visitors across CryptoCompare exchanges decreased from 12 million in December to 10.4 million in January.

6 **Bitcoin to Fiat Volumes** - In January, 48% of Bitcoin trading into fiat was made up of the US Dollar (1.47 million BTC), down from 57% in December. BTC trading into JPY decreased less (-24%) than that traded into USD (-49%) and EUR (-37%) since December. The USD, JPY and EUR made up 90% of total trading from Bitcoin into fiat in the previous month and remained dominance in January at 89% of BTC to fiat volume.

7 **Bitcoin to Stablecoin Volumes** - Bitcoin trading into USDT represented 65% of trading into stablecoins and fiat coins in January, up from the 63.7% seen in December. USDT, PAX, USDC and GUSD represent the most popular stablecoins in terms of Bitcoin trading volume. BTC trading into PAX increased 66% in January at 114,000 BTC in total; however, USDT still represents that majority at 5.9 million BTC.

Exchange Volumes

1. **Top Exchange Volumes** - ZB was the top exchange by total volume in January, followed by Binance and OKEX. The total volume for ZB in January was 19.6 billion USD, a 6.2% increase from December. The total volumes for Binance and OKEX fell 15% and 19.4% respectively in January.

2. **Trans-Fee Mining Exchanges** - CoinBene was the largest TFM exchange in January, followed by ZBG and EXX. CoinBene traded 10 billion USD in total volume in January, down 3.2% since December. ZBG traded 6 billion USD and EXX traded 5.5 billion USD, up 18 and 20% since December respectively.

3. **Decentralised Exchanges** - Ethermium was the largest DEX in January, followed by WavesDEX and OpenLedger. DEXs continue to represent only a small fraction of global spot exchange volume (0.19%), trading a monthly total of 385 million USD.

January Exchange News

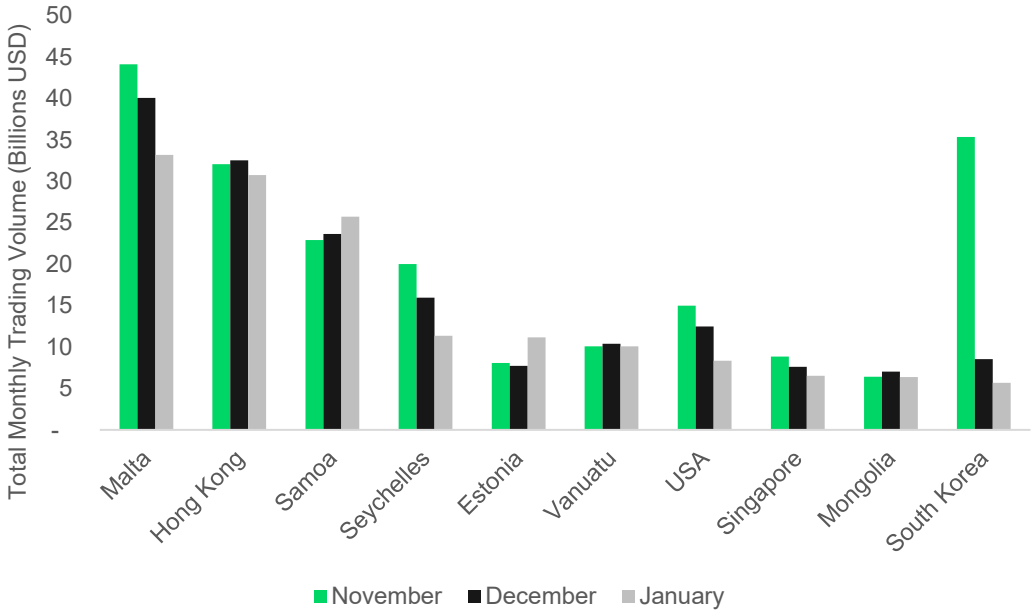
EXCHANGE	STORY	DATE
CoinFloor	CoinFLEX from CoinFloor to Launch with Physically-Settled Bitcoin Futures in February	7 Jan 2019
Coincheck	Coincheck Receives License a Year After Suffering $530 Million Hack	11 Jan 2019
BitTrex	Bittrex Introduces OTC Trading Desk, Supports 200 Digital Currencies	14 Jan 2019
Cryptopia	Cryptopia Hacked, Suspends Trading, Reports 'Significant Losses'	15 Jan 2019
Binance	New Binance Exchange in Jersey Lets You Trade BTC and ETH With EUR and GBP, and Supports 58 Jurisdictions	16 Jan 2019
HuobiPro	Huobi Group Acquires BitTrade, Relaunches Japan-based Crypto Exchange	18 Jan 2019
Komid	Komid Crypto Exchange Managers Sent to Prison for Generating Fake Volumes	21 Jan 2019
CBOE	CBOE Withdraws Proposal for VanEck-SolidX Bitcoin ETF	23 Jan 2019
Binance	Binance Launches OTC Trading Desk	24 Jan 2019
Liqui	Liqui Crypto Exchange Shuts Down Due to Lack of Liquidity	28 Jan 2019
Gemini	Gemini Passes AICPA-Recognized Security Audit, 'A World's First' in Crypto	30 Jan 2019
CBOE	Round 2: VanEck-SolidX Bitcoin ETF Proposal Is Resubmitted by CBOE	31 Jan 2019

Macro Analysis and Market Segmentation

This section aims to provide a macro view of the global cryptocurrency exchange market, with a focus on analyses that relate to exchange volumes. This will include an analysis of the highest volume producing jurisdictions, as well as market segmentation by exchange fee model. We also evaluate how spot volumes vs futures volumes have developed historically to date, including both crypto exchange (BitMEX and BitflyerFX) and traditional exchange (CBOE and CME) futures volumes. Finally, we conduct an analysis of bitcoin trading into various fiats and stablecoins, as well as an overview of how exchange web traffic has changed over the previous few months.

1 Country Analysis

Figure 1 - Historical Monthly Trading Volume by Jurisdiction - Top 10



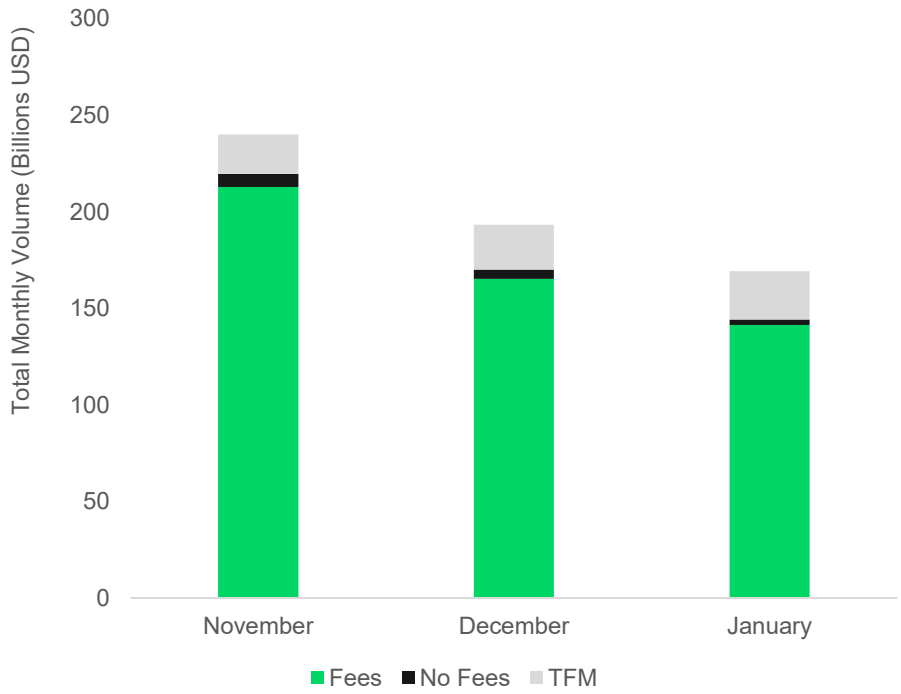
Monthly trading volume from Maltese-registered exchanges dropped 17% since December, while that of Hong Kong and Samoa-registered exchanges decreased by 5.5% and increased by 9% respectively.

Maltese-registered exchanges represented the majority of trading volume in January, followed by those legally registered in Hong Kong and Samoa.

Maltese trading volume decreased from 40 billion USD in December to 33 billion USD in January. Hong Kong registered exchanges decreased from 32 billion USD to 30.7 billion USD. Similarly, volumes of exchanges registered in Samoa increased from 23.6 billion USD to 25.7 billion USD.

2 Segmentation by Fee-Type

Figure 2 - Total Monthly Trading Volume by Predominant Fee Type



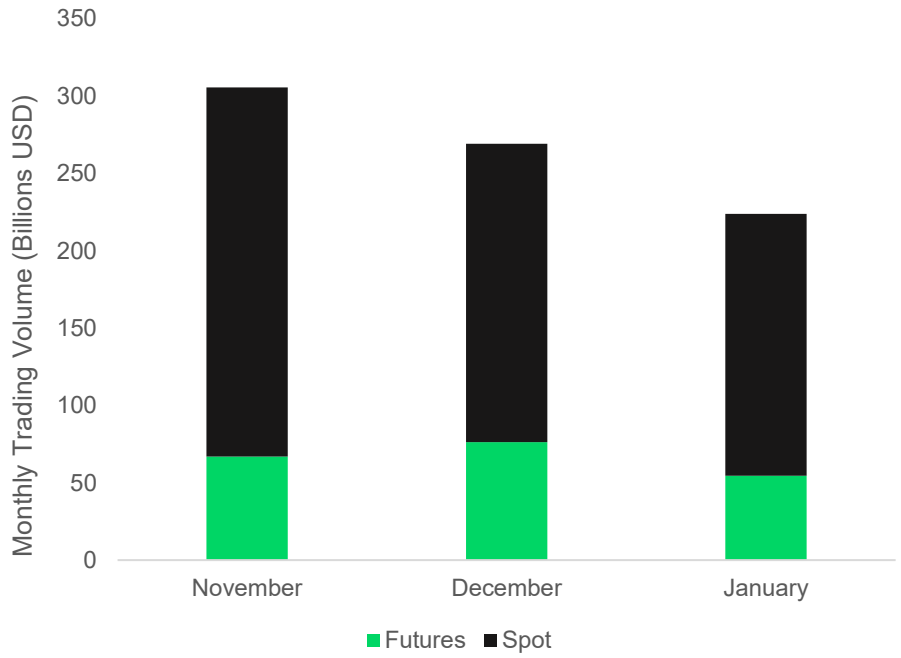
Exchanges that charge taker fees represented 84% of total exchange volume in January, while those that implement trans-fee mining (TFM) represented 15%.

Fee-charging exchanges traded a total of 141 billion USD in January, while those that implement TFM traded 25 billion USD. The remaining volume represented trading by exchanges that charge no trading fees, at 2.8 billion USD.

TFM market share increased from 12% to 15% in January**.** In absolute terms, this is an increase from 23 billion USD to 25 billion USD.

3 Segmentation by Product Type

Figure 3 - Historical Spot vs Futures Monthly Trading Volume



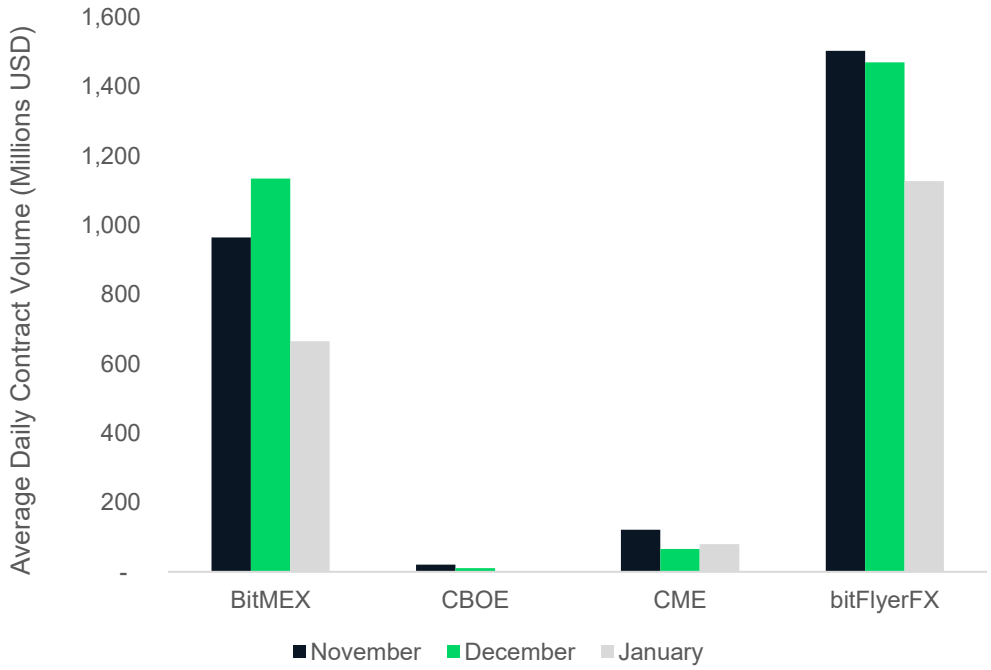
The proportion of futures trading volume[1] decreased from 28% in December to 24% in January.

Spot volumes decreased from 192 billion USD to 169 billion USD in January. Meanwhile, futures volumes decreased from 76.3 billion USD to 54.6 billion USD – a 28.4% decrease.

[1] bitFlyerFX (BTC-FX/JPY) and BitMEX (XBT/USD) contracts

4 Bitcoin Futures Trading: Cryptocurrency Exchanges Compared to Traditional Regulated Exchanges (CME and CBOE)

Figure 4 - Average Daily Bitcoin Futures Volumes



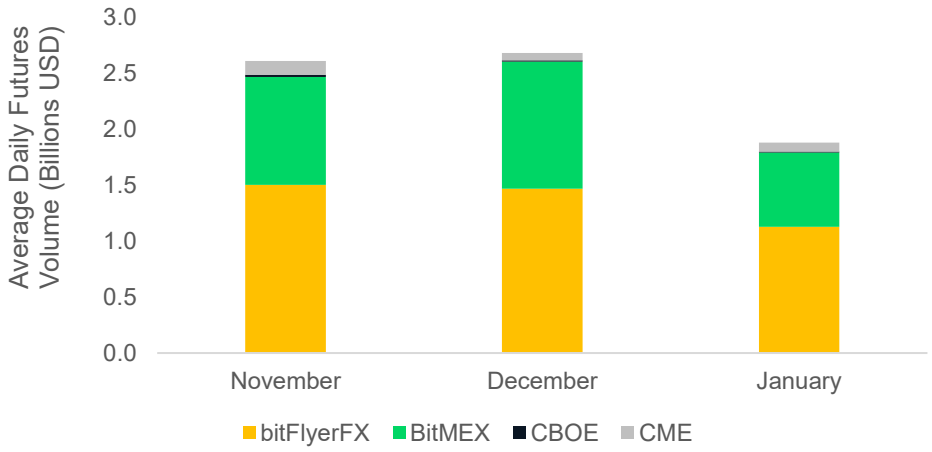
bitFlyerFX traded the highest amount of BTC futures volume[2] in January with a daily average transactional value of 1.13 billion USD (down 23% since December), followed by BitMEX perpetual futures[3] at 665 million USD (down 41% since December)

Meanwhile, the XBTUSD futures of traditional regulated exchanges CME and CBOE increased by 20% and fell by 24% respectively.

CME's average Bitcoin futures contract trading volumes increased from 66.5 million USD to 79.9 million USD. CBOE's Bitcoin futures volumes decreased from a daily average of 10.65 million USD to 8.1 million USD in January.

[2] BTC-FX/JPY perpetual futures
[3] XBT USD perpetual futures

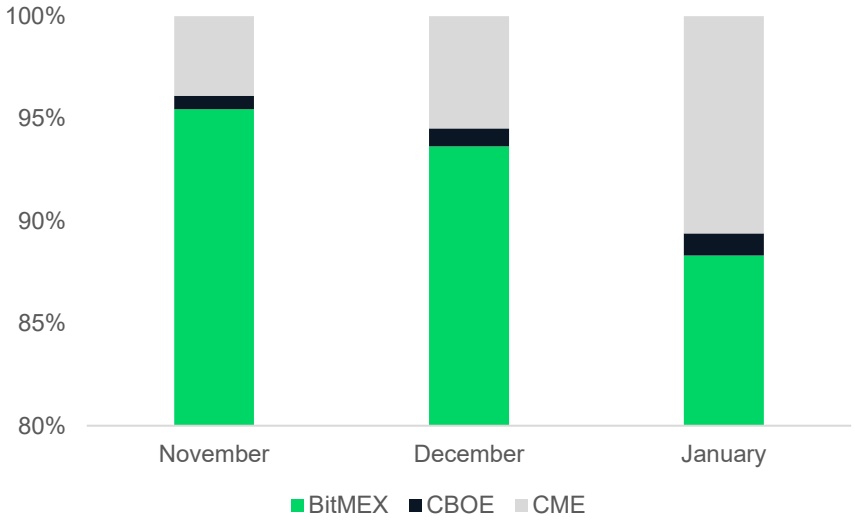
Figure 5 - Average Daily XBT Futures Value (Regulated and Crypto Exchanges)



Regulated exchanges (CME and CBOE) represented only 4.7% of the total crypto futures market in January[4].

The total futures market amounted to 1.88 billion USD in average daily volume in January. This represents a decrease of 29.9% since December.

Figure 6 - Average Daily XBT to USD Futures Value



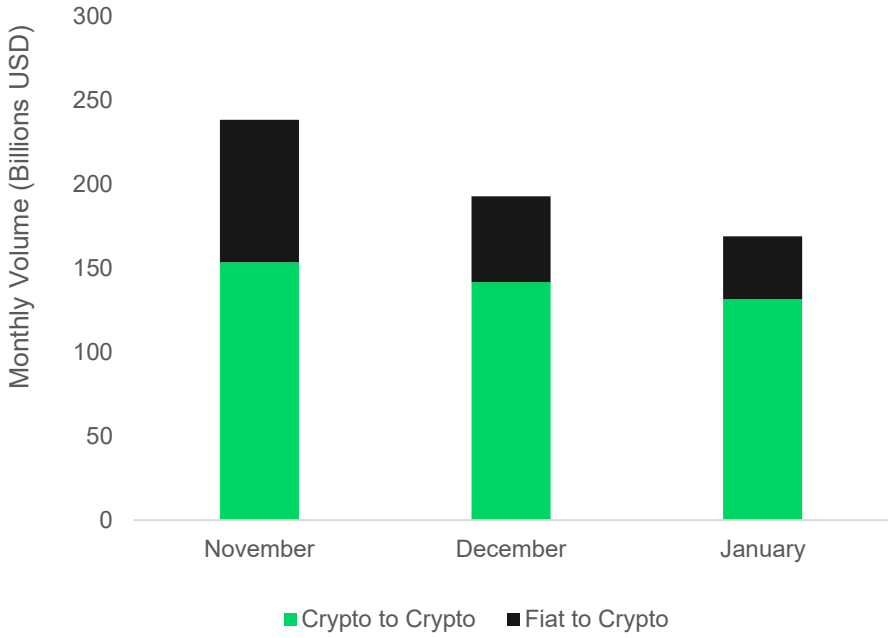
Futures products from traditional regulated exchanges (CME and CBOE) represented 11.7% of the Bitcoin to USD futures market in January, up from 6.36% in December.

BitMEX continued to represent the majority of XBTUSD futures contract volume in January at 88.3%.

[4] The current futures volume sample made up of the largest crypto exchanges BitMEX (XBTUSD perpetual) and bitFlyerFX (BTC-FX/JPY perpetual), and traditional exchanges CBOE and CME (BTC/USD futures)

5 Segmentation by Fiat Pair Trading Capability

Figure 7 - Monthly Total Volume: Crypto to Crypto vs Fiat to Crypto Exchanges



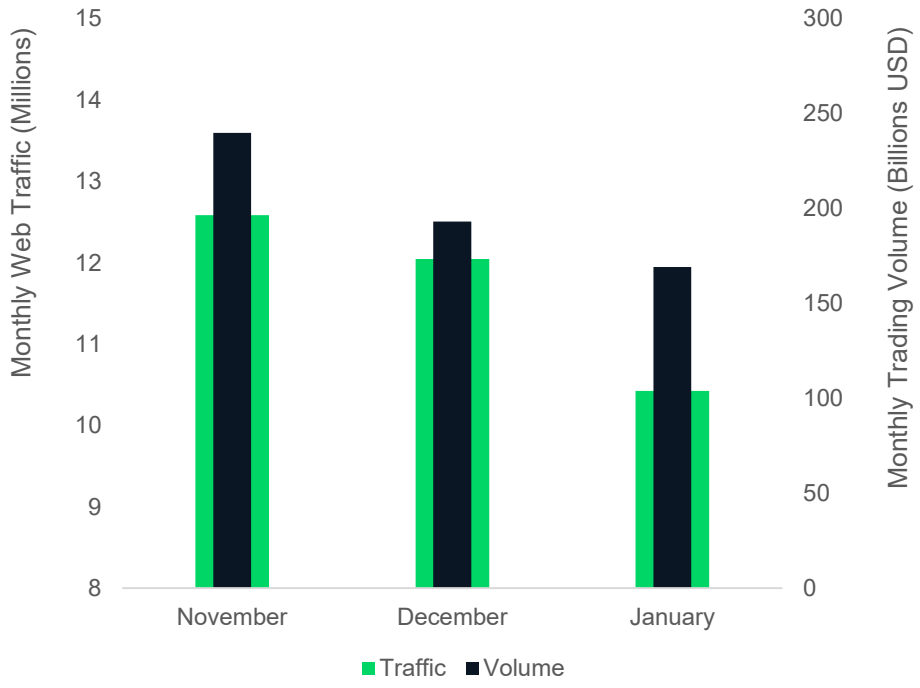
Trading volume from exchanges that offer fiat pairs decreased by 26.5% in January, while crypto to crypto exchange volume decreased by 7.2%.

Exchanges that offer fiat pairs traded 37.5 billion USD in January, whilst exchanges that trade only crypto to crypto traded 132 billion USD.

Following this large decline in fiat to crypto trading volume, fiat to crypto trading represented 22% of total spot volume, down from 26% in December.

6 Macro Web Traffic Statistics

Figure 8 - Historical Monthly Exchange Market Web Traffic vs Volume

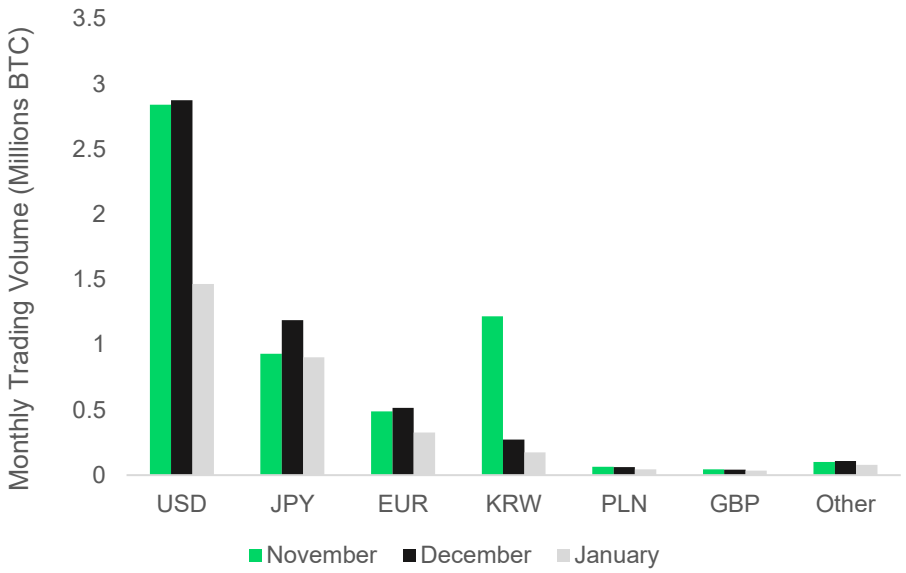


Total exchange web traffic continues its downward trend along with spot volumes, each dropping 13.5% and 12.4% respectively in January.

According to calculations based on Alexa traffic data, total monthly unique visitors decreased from 12 million in December to 10.4 million in January.

7 Bitcoin to Fiat Volumes

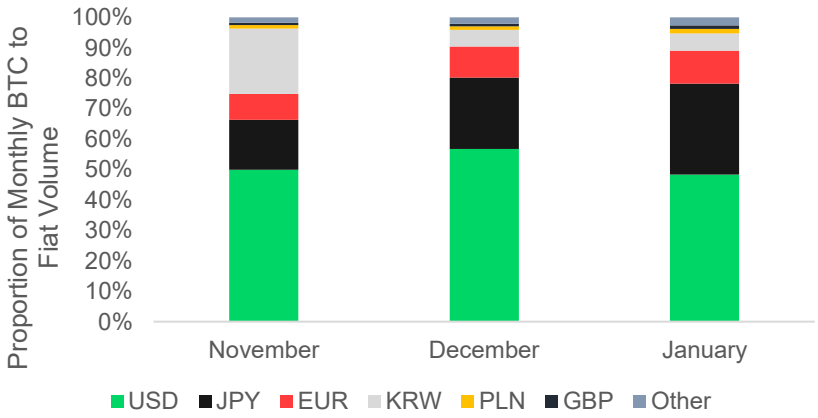
Figure 9 - Historical Monthly Bitcoin Trading Volume into Fiat



In January, 48% of all Bitcoin trading into fiat was made up of the US Dollar, down from 57% in December.

1.47 million BTC were traded into USD in January, down 49% from December. Bitcoin trading into JPY formed 30% of Bitcoin into Fiat in January, up from 23.5% in December and 16% in November. BTC trading into JPY since the previous month, decreased proportionally less (-24%) than that of USD (-49%) and EUR (-37%).

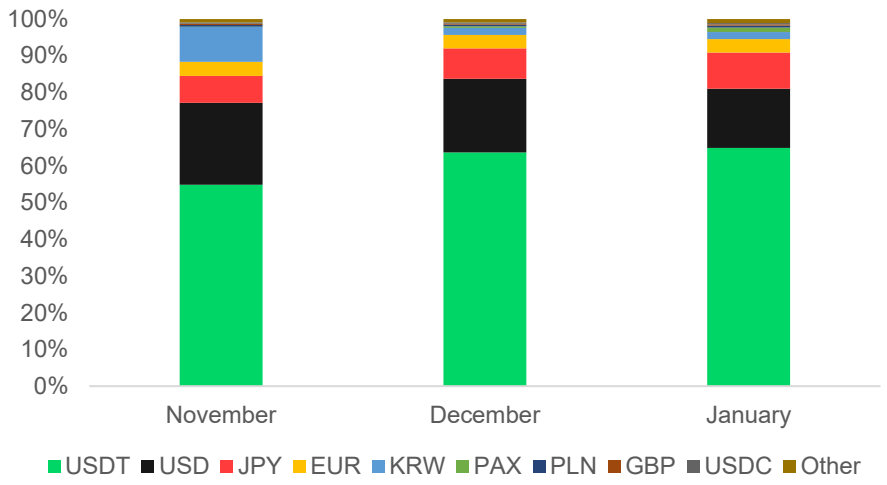
Figure 10 - Monthly Proportion of Bitcoin Trading into Fiat



In December, USD, JPY and EUR made up 90% of total trading from Bitcoin into fiat. In January, they remained dominant, with 89% of Bitcoin trading into fiat being into these three currencies.

8 Bitcoin to Stable Coin Volumes

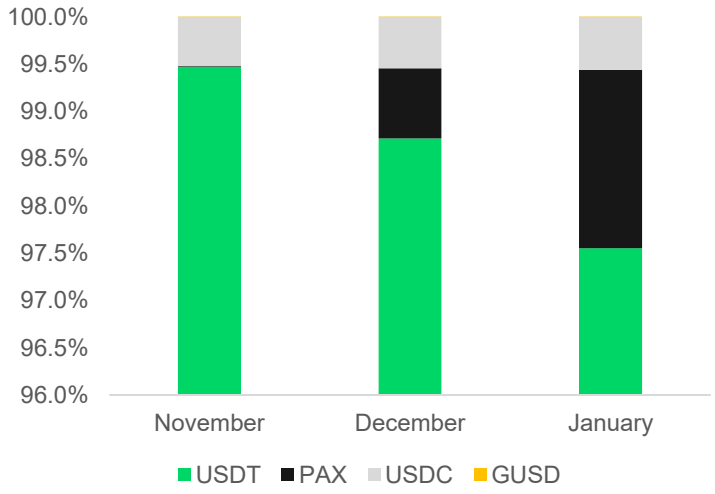
Figure 11 - Proportion of Bitcoin trading into Fiat or Stablecoins (USDT)



Tether (USDT) represented most of the Bitcoin trading into stablecoins in January.

Bitcoin trading into USDT represented 65% of trading into stablecoins and fiat coins in January, up slightly from 63.7% in December and 54.9% in November.

Figure 12 - Proportion of BTC Trading into Top Stablecoins



USDT continues to be the most popular stable coin for trading with Bitcoin.

USDT, PAX, USDC and GUSD represent the most popular stablecoins in terms of Bitcoin trading into the coins, representing nearly all trading into stablecoins from Bitcoin. USDT represents 97.6% of the total Bitcoin trading into these four coins.

Exchange Volume Rankings

Table 1 - Top 10 Spot Trading Exchanges by Average Daily Volume in January

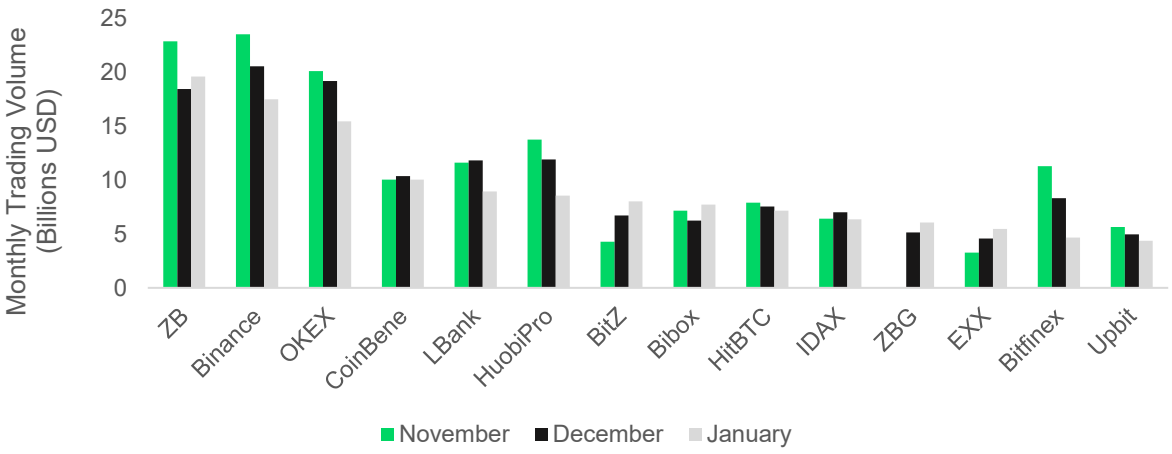
	AVG DAILY VOLUME (USD)	TOTAL MONTHLY VOLUME (USD)	PAIRS	COINS	MONTHLY WEB TRAFFIC
ZB	**633,149,905**	19,627,647,040	170	58	105,873
Binance	**565,061,618**	17,516,910,153	465	167	1,630,598
OKEX	**499,453,128**	15,483,046,963	550	183	197,058
CoinBene	**324,612,047**	10,062,973,462	214	182	33,898
LBank	**288,495,097**	8,943,348,008	130	89	114,667
HuobiPro	**276,302,995**	8,565,392,858	309	135	43,453
BitZ	**259,270,205**	8,037,376,362	237	153	125,702
Bibox	**249,567,909**	7,736,605,171	223	91	389,013
HitBTC	**231,164,031**	7,166,084,952	939	441	255,800
IDAX	**205,526,773**	6,371,329,972	163	95	1,262

Table 2 - Top 10 Spot Trading Exchanges by Number of Historical Pairs

	AVG DAILY VOLUME (USD)	TOTAL MONTHLY VOLUME (USD)	PAIRS	COINS	MONTHLY WEB TRAFFIC
Yobit	14,051,462	435,595,311	**7,309**	1,231	98,660
Cryptopia	441,115	13,674,552	**4,327**	787	287,640
CCEX	42,903	1,329,987	**2,133**	626	17,799
EtherDelta	39,606	1,227,793	**2,058**	2,057	19,770
TradeSatoshi	203,146	6,297,515	**1,068**	236	61,584
HitBTC	231,164,031	7,166,084,952	**939**	441	255,800
BitTrex	24,455,825	758,130,588	**648**	517	384,600
IDEX	368,577	11,425,900	**633**	630	44,237
LiveCoin	7,853,066	243,445,034	**598**	251	52,947
WavesDEX	1,259,756	39,052,437	**594**	163	53,338

1 Top Exchanges by Total Monthly Volume

Figure 13 - Historical Monthly Volume - Top Exchanges

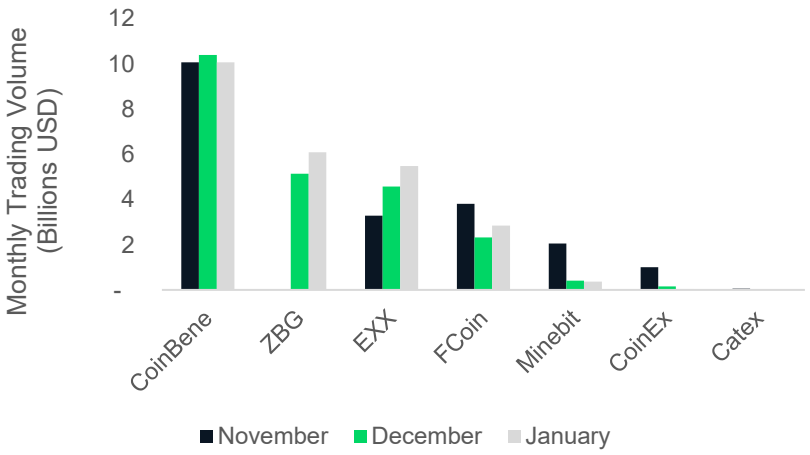


ZB was the top exchange by total volume in January, followed by Binance and OKEX.

The total volume for ZB in January was 19.6 billion USD, a 6.2% increase from December. The total volumes for Binance and OKEX fell 15% and 19.4% respectively in January.

2 Transaction Fee Mining Exchange Volume

Figure 14 - Historical Monthly Volume - Top Transaction-Fee Mining Exchanges

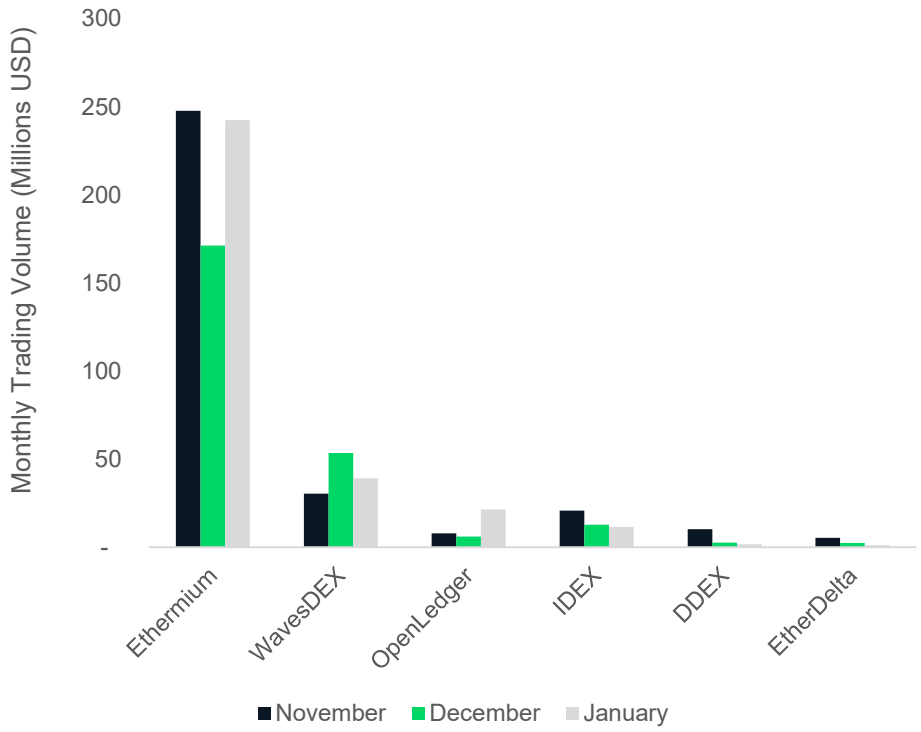


CoinBene was the largest TFM exchange in January, followed by ZBG and EXX.

CoinBene traded 10 billion USD in total volume in January, down 3.2% since December. ZBG traded 6 billion USD and EXX traded 5.5 billion USD, up 18 and 20% since December respectively. CoinBene, ZBG, EXX and FCoin represent a significant proportion of TFM volumes, forming over 98% of the top 7 TFM exchanges.

3 Decentralised Exchange Volume

Figure 15 - Historical Monthly Volume - Top Decentralised Exchanges



Ethermium was the largest DEX in January, followed by WavesDEX and OpenLedger.

Ethermium traded 242.5 million USD in monthly volume in January, up 41.6% since December.

OpenLedger saw a significant rise in volume in January, going from 5.9 million USD in December to 21.5 million USD in January.

WavesDEX volumes fell by 27% in January, to 39 million USD.

DEXs continue to represent only a small fraction of global spot exchange volume (0.19%), trading a monthly total of 385 million USD.

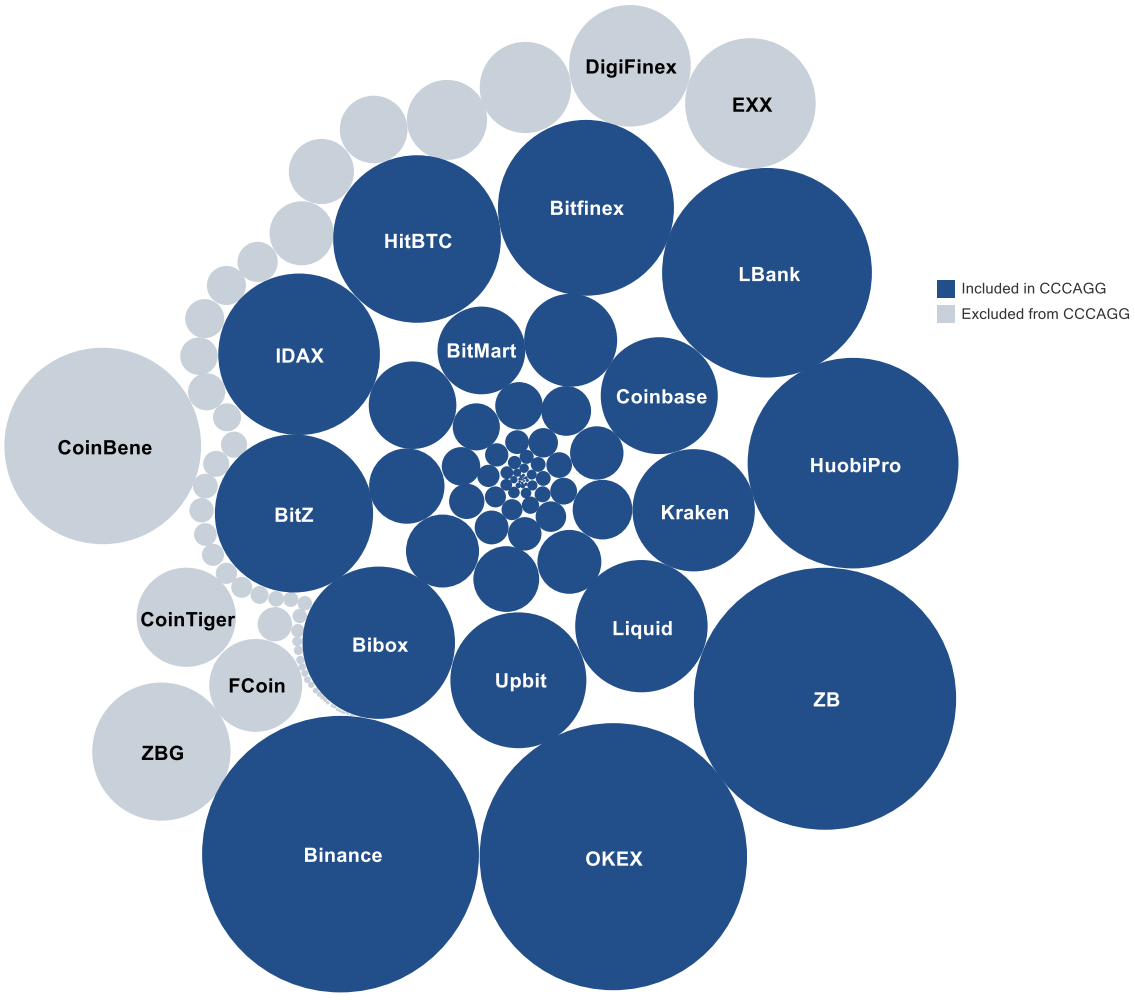
CCCAGG Exchange Review

CryptoCompare's Aggregate Pricing Index (the CCCAGG) is used to calculate the best price estimation of cryptocurrency pairs traded across exchanges. It aggregates transactional data from more than 70 exchanges using a 24-hour volume weighted average for every cryptocurrency pair.

However, this data might not always be consistent across exchanges due to events such as hackings, broken APIs, low liquidity levels, transaction fees, market manipulation and so on. It is important that the data used to calculate pricings originate from reliable exchange sources.

CryptoCompare's Monthly Exchange Review serves as a means of evaluating the integrity of exchange data used to calculate CCCAGG pricing across all pairs. Exchanges that have met the minimum data integrity standard will then be added to the pool of CCCAGG exchanges. Constituent CCCAGG exchanges are reviewed and amended each month to ensure that the most representative and reliable market data is used in CCCAGG pair pricing calculations.

Figure 16 - January CCCAGG Constituent Exchanges



1 Assessment of New CryptoCompare Exchanges

This section will evaluate exchanges added to CryptoCompare in December and have since generated data throughout December and January such that they can be assessed for inclusion into the CCCAGG in February.

New exchanges to be assessed: **CryptoExchangeWS**, **XS2, SafeCoin**

CryptoExchangeWS (will not be included in CCCAGG at present):

- Relatively low liquidity for most pairs. Only one pair, BTC_EUR has a reasonable level of liquidity at ~360,000 USD traded per day.
- Some consistency in terms of pricing between top pairs and the equivalent CCCAGG pairs. Nonetheless, these pairs show higher volatility (up to 3x versus CCCAGG).
- Further monitoring required before addition to CCCAGG

XS2 (will not be included in CCCAGG at present):

- Minimal liquidity, most pairs are not trading. Total daily volume amounts to ~1.5 USD on average for January.

SafeCoin (will not be included in CCCAGG at present):

- Minimal liquidity for most pairs. Average 24h volume in January for the exchange's top pair amounts to 385 USD.
- Only pairs unique to SafeCoin will be included in CCCAGG: SAFE_LTC, XSG_SAFE, SAFE_BTC.
- Significant pricing differences for most trading pairs versus the CCCAGG equivalent

2 Existing Exchanges to be Excluded from CCCAGG

No existing exchanges will be excluded from CCCAGG following this month's review.

3 Summary of Changes to CCCAGG

What Happened in January?	New exchanges added to CryptoCompare (4):	Alphaex, Binance Jersey, Bgogo, Bitpoint
	Exchanges shut down (ceased trading completely): (2)	Liqui, StocksExchangeio,
	Exchanges Removed from CCCAGG (0):	None
	December Exchanges Assessed Following Minimum Monitoring Period (3):	CryptoExchangeWS, XS2, SafeCoin
Result of Current Review:	New exchanges to be Included in CCCAGG (0):	None
	Existing exchanges to be included in CCCAGG (0):	None
	Exchanges to be Removed from CCCAGG (0):	None
Implementation Date	18th February 2019	

Appendix A - Methodologies

A1 General CCCAGG Inclusion/Exclusion Methodology

This review is conducted on a monthly basis in order to maintain a minimum exchange standard among constituent CCCAGG exchanges. Given the growing number of cryptocurrency exchanges, as well as those that close due to regulation, bankruptcy and so on, it is necessary to evaluate whether prices and volumes are representative of the market so that investors and fund managers using the CCCAGG indices can be assured that they receive the most accurate information for their purposes.

We are not in the business of policing cryptocurrency exchanges, but aim to set a guideline based on how the majority of cryptocurrency exchanges operate. These majority figures are used as a standard with which to assess whether an exchange is operating in line with most of its industry. Having said this, the industry is constantly evolving and often times one cryptocurrency exchange might not reflect the patterns demonstrated by the majority, for reasons that might relate to innovation, an alternative business model etc. In these cases, CryptoCompare attempts to use its best judgement with preference towards a hands-off approach so that industry developments are accurately reflected. Over time, our guiding standards with which to assess cryptocurrency exchanges will also develop in line with the industry to produce the most representative group of CCCAGG exchanges.

Data Processing Procedure

CryptoCompare currently assesses exchanges on the basis of 24-hour volume and pricing data. Every exchange within the CCC database is assessed in this review, with additional exchanges being added or excluded on a monthly basis for a variety of reasons. The 24-hour volume and price of every live trading pair from every exchange is recorded. Each pair volume is compared to the total market volume for that specific pairing and assigned a market share ranking. Pricing for each pair is compared to that of the CCCAGG pair, and a percentage price difference is calculated. Finally, a volume weighted % price difference per pairing is calculated to produce a figure for how close the overall exchange pricing differences are to that of the CCCAGG.

% Price Difference vs CCCAGG

As a general guideline, CryptoCompare assumes that exchanges with an overall percentage pricing difference of under 10% is within acceptable boundaries. The reasons for pricing differences across exchanges may be related to a number of factors that include exchange fees, jurisdiction, tax considerations among a series of other factors. It is however, the first indicator of acceptability within the CCCAGG exchange list.

Assessment Period

For new exchanges added to the platform, CryptoCompare assigns a period of time in which to gather data on the exchange before adding it directly to the CCCAGG calculations. Up to the next monthly exchange review, as long as there is adequate positive volume and pricing data, the exchange will be assessed in the same way as all the existing exchanges and added to the CCCAGG if guidelines are met.

Dead Exchanges

Frequently, exchanges will stop trading for a variety of reasons that include bankruptcy, hackings, regulatory reasons and so on. Contingent upon sufficient market data being provided (usually one month), if an exchange has minimal to no trading volume, it will be excluded from the CCCAGG and will be assigned an inactive status.

Market Share for Specific Pairs

There are many cases in which significant pricing differences occur relative to the CCCAGG for a number of pairs that only trade on very few exchanges. The reason for this often points to a lack of liquidity for specific pairs or perhaps a decentralized exchange. If this is the case, then there is usually an exception to the 10% pricing guideline vs CCCAGG pricing. Providing that a specific pair on an exchange represents at least 20% of the market volume or ranks at least third for market share, and prices are within a reasonable boundary, this pair would be deemed acceptable. In addition, for certain pairs that are unique to a small number of exchanges, pricing will vary considerably the lower the liquidity of the pair in question. In this case, more flexibility is given to pricing differences on low liquidity pairs.

Current CryptoCompare Policy Towards Zero-Fee and TFM Exchanges

Zero-fee exchanges as well as transaction-fee mining exchanges present a problem when it comes to assessing whether trading volume as well as pricing are legitimate due to the well-known criticisms of exchanges engaged in these practices. When it comes to zero-fee exchanges, traders are able to trade freely without fees regardless of how many trades are made; hence, volumes might become inflated. In a similar fashion, transaction fee mining exchanges rebate 100% of transaction fees in the form of their own exchange tokens. This might give traders an incentive to trade more to receive more tokens which often have valuable features such as voting rights on the platform or a dividend. Both of the above can effectively lead to wash trading. For this reason, transaction-fee mining trading data is excluded from CCCAGG pricing calculations in the current policy. This policy will be reviewed and improved for when more in-depth analysis has been conducted.

Futures Trading

Despite the significant volumes witnessed for bitcoin futures trading on platforms such as BitflyerFX and BitMEX, these volumes represent futures trading volume, and not spot trading volumes. For this reason, they are excluded from CCCAGG calculations.

A2 Web Traffic Analysis Methodology

All web traffic statistics were collected using Alexa's web traffic API endpoint. This served as the best way to obtain the most broad and accurate set of statistics across all the exchanges that CryptoCompare evaluates.

Alexa Methodology

For the purpose of our web traffic analysis, Alexa's historical Traffic Ranks, as well as Pageviews have been used over a one-month period. Alexa computes traffic ranks by analysing the Web usage of millions of Alexa Toolbar users. The information is then manipulated, computed and normalised to correct biases that may occur in their data.

Definitions:

Alexa Traffic Rank: determined on the basis on the combined measure of Unique Visitors (reach) and Pageviews (page views).

Unique Visitors: An estimate of the number of unique Alexa users who visit a site on a given day. Alexa expresses this as a ratio of users per million - that is, if a random sample of one million global internet users were taken, then x % of those users would visit a given site.

Pageviews: Pageviews are the total number of Alexa Toolbar user URL requests for a site on a given day. Multiple requests for the same URL on the same data by the same user are counted as a single Pageview. This is expressed as a ratio of pageviews per million users.

Page Views per User: Represents the average number of unique pages viewed per user per day for a given site.

Important Data Considerations

It should be noted that Alexa's Traffic Ranks are for domains only (www.domain.com), and therefore subdomains (www.subdomain.domain.com) or subpages (www.domain.com/subpage) are counted within the same domain name.

There are limits to the accuracy of Alexa data for sites with relatively low traffic. According to Alexa, for sites with rankings below 100,000, data may not be statistically meaningful due to the lack of data from these sources.

In addition, traffic data is only based on a set of Alexa users, and therefore only a subset of the global internet population.

Exchange Web Traffic Analysis Methodology

For the purpose of our web traffic analysis, Alexa's daily historical Traffic Ranks, Pageview stats and Unique Users have been used over a one-month period.

Methodology

Data was collected via Alexa's Web Traffic API endpoint for a period of one month. Daily Domain Traffic stats for every active exchange on CryptoCompare was collected for a one-month period.

As discussed, Alexa provides proportional measures of Unique Visitors and Page Views in the form of "reach" per million users and "page views" per million users respectively. This was collected via their web API.

In order to obtain an estimate of visitors, an estimate of total web users was obtained from "internetworldstats.com". According to internetworldstats.com, as of June 30th 2018, there were a total of 4,208,571,287[5] global internet users.

This was then multiplied by the associated Alexa metric per million figures to obtain an estimate of Unique users and Total Page views. A figure for unique page visitors was

[5] https://www.internetworldstats.com/stats.htm

calculated by dividing Total Page Views by average Page Views per user. Formulas are as follows:

*Total Page Views = Page Views per million * Total Web Users*

*Total Unique Visitors = Page Views per million * Total Web Users / Average Page Views per User*

Given the oscillatory nature of web traffic stats, a one-month average of each stat was produced to obtain a more representative traffic value for each exchange. This is then combined with the average 24h volume for each exchange over the given period to initiate our analysis.

A3 Order Book Analysis Methodology

Purpose

The main purpose of the order book analysis is to investigate the relative stability of various cryptocurrency exchanges on the basis of how much volume (bought or sold) it would require to move the price of a given market by 10%. In other words, how much USD at the current market price would result in slippage of 10% across the top pairs of various exchanges? Markets on exchanges that are less stable or more at risk of manipulation, are those for which prices can be moved with less USD.

Data Collection

Order book snapshots were queried from each exchange's order book API endpoint for its top 5 trading pairs, in 10-minute intervals. Together with each snapshot, the best bid, best ask, 24h volume and latest price was also collected, as well as a price conversion to USD such that all markets are comparable.

Definitions

Order Book Depth: In the context of this analysis, "order book depth" is defined as the cumulative volume in USD at each side of the order book such that the price moves 10%.

Depth Down: The sale of volume in USD required to move the price of a given market down 10%. In other words, this represents the cumulative sum of bids (in USD) that would result in slippage of 10% downwards.

Depth Up: The amount of volume in USD required to move the price of a given market up 10%. This represents the cumulative sum of asks (in USD) that would result in slippage of 10% upwards.

Slippage: The percentage change in market price after a given market order is placed.

24h Pair Volume: The 24h volume (in USD) for a given pair on a given exchange.

Average Depth Down to Average 24h Pair Volume Ratio: Represents the relative stability of a given exchange as a ratio of average depth down (for the top 5 pairs), over the average 24h pair volume (for the same top 5 pairs) of each exchange. In other words, what percentage of daily volume on average for a given market would be required to move the price 10% downwards.

Calculation Methodology:

For each exchange, an average depth down value over a period of one month in 10-minute intervals, was calculated for each of its top 5 pairs. An average of the average depth down across each pair was then calculated to produce an overall depth down figure for each exchange across this time period. The same was done for average 24h pair volume across each of the top 5 pairs.

Limitations:

It must be understood that although the top 5 markets of each exchange capture the majority of volume on top exchanges, not all markets are equivalent. That is, the BTC to USD market might behave very differently to the BTC to ETH market. An average across the top 5 pairs may distort the particularities of a specific market. Nonetheless for the purpose of obtaining a broad view of how an exchange behaves, averaging the top 5 markets is deemed perfectly acceptable for this analysis.

Another limitation here is that top exchanges often trade significantly more than 5 pairs. Binance or HitBTC for instance offer hundreds of markets; assessing only the top 5 pairs does not capture the full picture, while for Coinbase it may be far more representative.

Finally, given that markets often change within a matter of seconds, snapshots of ten-minute intervals often lose important information in between these intervals. For future analysis, a deeper analysis into the behaviour of exchange markets by the second will need to be conducted to capture this behaviour.

Appendix B - Table of Figures and Tables

Table of Figures

Table of Tables