Kaiko's Research Factsheet provides a comprehensive overview of cryptocurrency markets through weekly updated metrics, derived from historical trade and order book data.

Monday, October 19th, 2020

**Bitcoin Liquidity Increases Despite Decline in Volume**

- Bitcoin traded above $11k for the 10th day in a row as institutional interest in the cryptoasset continued to grow.
- Filecoin had an extremely volatile first few days of trading, falling from a peak above $90 to just $31 as of Monday morning.
- 20-day volatility for both traditional financial assets and cryptocurrencies has remained virtually unchanged for the past two weeks.
- Despite a week-on-week fall in Bitcoin-Dollar trading volume, market depth continued to rise and spreads narrowed, indicating order book liquidity is on the rise.

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1. PRICE AND VOLUME

**Fig. 1 - Percentage Price Change (7 Days)**

<table>
<thead>
<tr>
<th></th>
<th>BTC/USD</th>
<th>ETH/USD</th>
<th>XRP/USD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage Price Change</td>
<td>1.21%</td>
<td>1.07%</td>
<td>-5.21%</td>
</tr>
</tbody>
</table>

**Fig. 2 - Weekly Close**

<table>
<thead>
<tr>
<th></th>
<th>BTC/USD</th>
<th>ETH/USD</th>
<th>XRP/USD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Close</td>
<td>11,515</td>
<td>378.57</td>
<td>0.24</td>
</tr>
</tbody>
</table>

**Fig. 3 - Price Evolution**

- **BTC/USD Price**
- **ETH/USD Price**
- **XRP/USD Price**

**Fig. 4 - Daily Return (Lines) & Daily Volume (Bars)**

Daily return is computed as the difference between the close price for the data point and the close price on the previous day, divided by the price on the previous day.

Daily Traded Volume equals the amount of the base asset traded against USD.
The probability that there will be extreme daily returns of +/-5%, +/-10% or +/-15% based on the observed frequency of such daily returns for each pair. Calculations are made using the previous 3 months of market data.
2. EXCHANGE VOLUME

Fig. 10 - Daily Trading Volume (Per Exchange), in USD

Fig. 11 - Trading Volume (Per Exchange), Past Week, in USD
The annualized volatility of each asset represented in this box-and-whisker plot is derived from the annualized 20-day rolling standard deviation of daily log returns.

The assessed timeframe is 6 months. This representation of volatility depicts the spread of volatility for each asset, showing the overall distribution of volatility. The line that separates each box is the median and data is separated in 4 quartiles.
Bollinger Bands are the two standard deviation curves below and above the 7-day moving average of the price of Bitcoin. Standard deviation is a measure of price volatility. Bollinger Bands depict how prices are dispersed around the average value, indicating whether a crypto asset is undersold or oversold. In periods of low volatility, Bollinger Bands contract and in periods of high volatility they expand.

**Fig. 16 - Correlation Matrix of Returns (Past month)**

<table>
<thead>
<tr>
<th></th>
<th>BTC/USD</th>
<th>ETH/USD</th>
<th>XRP/USD</th>
<th>GOLD</th>
<th>NASDAQ</th>
<th>S&amp;P500</th>
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</thead>
<tbody>
<tr>
<td>BTC/USD</td>
<td>1.0000</td>
<td>0.9495</td>
<td>0.7693</td>
<td>0.3179</td>
<td>0.3632</td>
<td>0.4892</td>
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<tr>
<td>ETH/USD</td>
<td>0.9495</td>
<td>1.0000</td>
<td>0.8173</td>
<td>0.3997</td>
<td>0.4907</td>
<td>0.5765</td>
</tr>
<tr>
<td>XRP/USD</td>
<td>0.7693</td>
<td>0.8173</td>
<td>1.0000</td>
<td>0.2324</td>
<td>0.5680</td>
<td>0.6483</td>
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<tr>
<td>GOLD</td>
<td>0.3179</td>
<td>0.3997</td>
<td>0.2324</td>
<td>1.0000</td>
<td>0.2278</td>
<td>0.3017</td>
</tr>
<tr>
<td>NASDAQ</td>
<td>0.3632</td>
<td>0.4907</td>
<td>0.5680</td>
<td>0.2278</td>
<td>1.0000</td>
<td>0.9443</td>
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<tr>
<td>S&amp;P500</td>
<td>0.4892</td>
<td>0.5765</td>
<td>0.6483</td>
<td>0.3017</td>
<td>0.9443</td>
<td>1.0000</td>
</tr>
</tbody>
</table>

1 = perfectly correlated
0 = no linear interdependence
-1 = perfectly anticorrelated

**Fig. 17 - 30 Day Rolling Correlation of Returns with Bitcoin (BTC/USD)**
4. ORDER-BOOK LIQUIDITY

**Fig. 18 - Bid-Ask Spread** (in basis points)

The bid-ask spread is the difference between the best ask and the best bid for an asset. We normalize our Spread calculation by dividing by the mid price. Spread is an indicator of a market’s liquidity. The tighter the spread, the more attractive a market is for traders. Markets with wider spreads are generally less liquid and more costly to trade on.

<table>
<thead>
<tr>
<th>BTC/USD (Volume in the base asset)</th>
<th>ETH/USD (Volume in the base asset)</th>
<th>XRP/USD (Volume in the base asset)</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="chart1.png" alt="BTC/USD Chart" /></td>
<td><img src="chart2.png" alt="ETH/USD Chart" /></td>
<td><img src="chart3.png" alt="XRP/USD Chart" /></td>
</tr>
<tr>
<td><img src="spread.png" alt="Spread Chart" /></td>
<td><img src="depth.png" alt="2% Depth Chart" /></td>
<td><img src="depth.png" alt="2% Depth Chart" /></td>
</tr>
</tbody>
</table>

**Fig. 19 - 2% Market Depth**

2% market depth is the sum of the quantity of both bids and asks placed within 2% from the midprice on a trading pair’s order book. Market makers will place bids and asks at various price levels surrounding the midprice. Depending on the current midprice, we take the sum of all bids and asks within a 2% range, and average this sum over time. Generally, the greater the market depth for a trading pair, the more liquid the market.
Price slippage refers to the difference between the expected price of a trade and the price at which the trade is executed. Price slippage can result from insufficient order book depth or changes to the bid/ask spread in between the time an order is placed and an order is executed. Our slippage calculator measures average price slippage of a $50k Sell Order on 8 exchanges. The logarithmic vertical axis indicated the evolution of slippage through exchanges for a given pair.
METRICS DESCRIPTION

1. PRICE AND VOLUME

Fig. 1 - Percentage Price Change (7 Days)
Percentage Price Change is computed as the difference between the close price on the last day of the week and the close price on the first day of the week, divided by the price on the first day of the week. This daily close is the price observed on our selected sample of exchanges*, and is derived from our direct exchange rate calculation, which is the volume-weighted average price on the selected time interval (daily).

Fig. 2 - Weekly Close
Latest close price observed for the three most traded cryptoassets (US dollar). This daily close is the price observed on our selected sample of exchanges*. It is derived from our direct exchange rate calculation, which is the volume-weighted average price on the selected time interval (daily).

Fig. 3 - Price Evolution
Hourly price evolution of the three major crypto/USD pairs. This data is derived from our direct exchange rate calculation, which is the average price on the selected time interval (hourly). The period covered is the previous week relative to the publication date of the factsheet. Max and Min prices throughout that week are highlighted. Data shown for selected exchanges*.

Fig. 4 - Daily Return & Daily Volume
Daily return is computed as the difference between the close price for the data point and the close price on the previous day, divided by the price on the previous day. The daily close is the price observed on our selected sample of exchanges*. The price is derived from our direct exchange rate calculation, which is the volume-weighted average price on selected exchanges, on the selected time interval (daily). Daily Traded Volume equals the amount of the base asset traded against other assets (both crypto and fiat). Data shown for selected exchanges*.

Fig. 5 - Hourly Returns
Evolution of hourly close price returns, across selected exchanges*, for the three chosen pairs. Close price corresponds to the direct exchange rate, which is the volume-weighted average price on the selected time interval (hour).

Fig. 6 - Miracles and Disasters: Probabilities of extreme positive and negative returns.
The probability that there will be extreme daily returns of -/+5%, -/+10% or -/+15% based on the observed frequency of such daily returns for each pair. Calculations are made using the daily close price for the past 3 months, which is calculated from our direct exchange rate, which is the average price on the selected time interval (daily).

Fig. 7 - Weekly Percentage Volume Change
The weekly percentage volume change reflects the trading volume evolution, week by week. For example, from March 04 to March 10, Bitcoin’s trading volume increased by 10.20%. These volumes are derived from a select number of exchanges*.

Fig. 8 - Stablecoin Daily Price, Daily Returns, and Volume
Stablecoin Daily Price corresponds to the direct exchange rate, therefore the average price on the selected time interval (daily). Daily Percentage Price Change, is computed as the difference between the close price at a certain day and the close price on the previous day, divided by the price on the previous day. This daily close is derived from our direct exchange rates calculation for selected exchanges*.
Traded volume in US dollars of several well known stablecoins backed by the US dollars (1 stablecoin = 1 USD in principle). The assessed timeframe is the previous 2 months in relation to the publication of the Factsheet. This volume was calculated using data from selected exchanges covered by Kaiko.

Fig. 9 - Tether Price and Volume in US dollars
Tether Daily Price corresponds to the direct exchange rate, therefore the average price on the selected time interval (daily). Traded volume

* Binance, Coinbase, Kraken, Bitstamp, Bitfinex, Poloniex, bitFlyer, Bittrex and Gemini
calculated from all exchanges covered by Kaiko, of the most traded stablecoin backed by the dollar, Tether USD (USDT).

2. EXCHANGE VOLUME

Fig. 10 - Daily Trading Volume (Per Exchange)
The Daily Traded Volume equals the amount of the base asset traded against other assets (both crypto and fiat) on each exchange*. This chart presents the evolution of the traded volume of each asset (BTC, ETH, and XRP) trading against USD, on each selected exchange, over the past 2 weeks.

Fig. 11 - 7 Day Trading Volume
The Total Traded Volume over the past 7 Days relative to the publication of the factsheet, equals the amount of the base asset traded against other assets (both crypto and fiat) on each exchange*.

Fig. 12 - Weekly Percentage Volume Change (Per Exchange)
The weekly percentage volume change reflects the trading volume evolution, week by week. For example, from March 04 to March 10 Bitcoin’s trading volume on Bitstamp increased by 16.78%. These volumes are derived from a select number of exchanges*.

3. VOLATILITY & CORRELATION

Fig. 13 - Realized 20-day Volatility of Cryptoassets, Stablecoins, and Traditional Assets
The annualized volatility of each asset represented in this box-and-whisker plot is calculated as the annualized 20-day rolling standard deviation of daily log returns. The assessed timeframe is 6 months. This representation of volatility depicts the spread of volatility for each asset, showing the overall distribution of volatility. The line that separates each box is the median and data is separated in 4 quartiles.

Fig. 14 - Realized 20-day Volatility
The annualized volatility of each asset represented is based on the annualized 20-day rolling standard deviation of daily log returns.

Fig. 15 - Bollinger Bands
Bollinger Bands are the two standard deviation curves below and above the 7-day moving average of the price of Bitcoin. Standard deviation is a measure of price volatility. Bollinger Bands depict how prices are dispersed around the average value, indicating whether a cryptoasset is undersold or oversold. If the market price ends up at the upper end of the bollinger bands it’s maybe over extended and vice versa. In periods of low volatility, Bollinger Bands contract and in periods of high volatility they expand. Bollinger bands should capture 95% of price movements. Data used is hourly price data across all exchanges.

Fig. 16 - Correlation Matrix of Returns (Past Month)
The correlation matrix is calculated using the daily log returns over the past month, for selected crypto-pairs and traditional indexes including Nasdaq, S&P 500 and gold. The correlation coefficient takes a value of 1 when two assets are perfectly correlated, 0 when there is no linear interdependence, and -1 when perfectly anticorrelated.

Fig. 17 - 30 Day Rolling Correlation of Returns with Bitcoin (BTC/USD)
30 Day Rolling Correlation of Returns of several traditional assets and cryptoassets with Bitcoin, calculated using daily log-returns. Returns for the cryptoasset pairs are derived from our direct exchange rate calculation, which is the average price on the selected time interval (daily). Prices of traditional assets are daily close prices.

4. ORDER BOOK LIQUIDITY

Fig. 18 - Bid-Ask Spread (in basis points)
The bid-ask spread is the difference between the best ask and the best bid for an asset. We normalize our Spread calculation by dividing by the mid price. Spread is an indicator of a market’s liquidity. The tighter the spread, the more attractive a market is for traders. Markets with wider spreads are generally less liquid and more costly to trade on.
FIG. 19 - 2% Market Depth
2% market depth is the sum of the quantity of both bids and asks placed within 2% from the midprice on a trading pair’s order book. Market makers will place bids and asks at various price levels surrounding the midprice. Depending on the current midprice, we take the sum of all bids and asks within a 2% range, and average this sum over time. This data is derived from raw order book snapshots, which we take twice per minute for all trading pairs. Generally, the greater the market depth for a trading pair, the more liquid the market.

Fig. 20 - Slippage for a $50k Sell Order
Price slippage refers to the difference between the expected price of a trade and the price at which the trade is executed. Price slippage can result from insufficient order book depth or changes to the bid/ask spread in between the time an order is placed and an order is executed. Our slippage calculator measures the average price slippage of a $50k Sell Order on 8 exchanges. The logarithmic vertical axis shows the evolution of slippage across exchanges for a given pair.

SLIPPAGE CALCULATION
We calculate slippage using raw order book snapshots collected directly from the exchanges we cover. Our order book snapshots include all bids and asks within 10% of the mid price. Slippage is calculated for all bids and asks within this 10% range, for all order book snapshots taken. The steps below run through an example calculation for placing a $50k buy market order which would give a value for Ask Slippage. The same steps can be followed for sell orders and orders of different values.
Step 1: Run through sorted Asks by price level until $50k buy order is filled, starting from the Best Ask.
Step 2: Compute the Average Buy Price using all Asks needed to fill the $50k order. For example, in an imaginary order book where there are Asks at $10,000 for 3 Bitcoin and Asks at $10,100 for 4 Bitcoin, the Average Buy Price would be ($30,000 + $40,400)/7 = $10,057.
Step 3: Calculate the percentage of variation between the Best Ask and Average Buy Price using the formula: [Average Buy Price — Best Ask] / Best Ask.

Fig. 21 - Slippage for a $50k Sell Order
Same as Fig 8 but with a one day moving average slippage that smoothenes the trend. The logarithmic vertical axis shows the evolution of slippage across exchanges for a given pair.

DATA SOURCES
All crypto related data is taken from Kaiko https://www.kaiko.com/.
Traditional assets data is taken from FRED St Louis API. https://fred.stlouisfed.org/.

ABOUT KAIKO
Founded in 2014, Kaiko is a market data provider in the blockchain-based digital assets space, providing institutional investors and market participants with enterprise-grade data infrastructure. We collect, normalize, store, and distribute digital assets market data via a livestream WebSocket, REST API, and cloud-based CSV Data Feed, to which clients connect to build data-driven applications. Our raw trade data, order books, and aggregates cover 10,000+ currency pairs across 70+ exchanges, with new markets added every day. With over five years of historical data, Kaiko provides the most extensive digital asset datasets in the industry. Kaiko caters for the market data needs of professional investors, academic researchers, regulators, security issuers, third-party platforms and exchanges.

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