

Market events on-chain

Large bitcoin inflows to exchanges often coincide with price volatility

Summary

- Cryptocurrency markets are volatile, sometimes extremely so. While the causes of recent volatility, in early March 2020, are clear – [an unprecedented inflow of cryptocurrency to exchanges in response to the COVID-19 pandemic](#) – it is often difficult to identify the cause of volatility. This is despite the vast amount of data available.
- We developed a methodology to algorithmically identify on-chain events, which are short but significant changes in the trend of flows of bitcoin into exchanges. These often correspond to large changes in price without obvious external explanation. We believe such analysis will be key to making the right decisions as markets recover.
- We investigate one of these events by comparing market sentiment on BitMEX, the largest cryptocurrency derivative market, and on-chain inflows to exchanges.
- We find an interesting sequence of events. Large amounts of bitcoin are sent in a few transfers to spot exchanges, followed by an anomalously large contrarian short position on BitMEX, followed by a sharp decline in price.
- Finally, we show how to automatically identify the exchange that was the first to receive a consistent increase in flows, which is the exchange most likely to have started the price change.

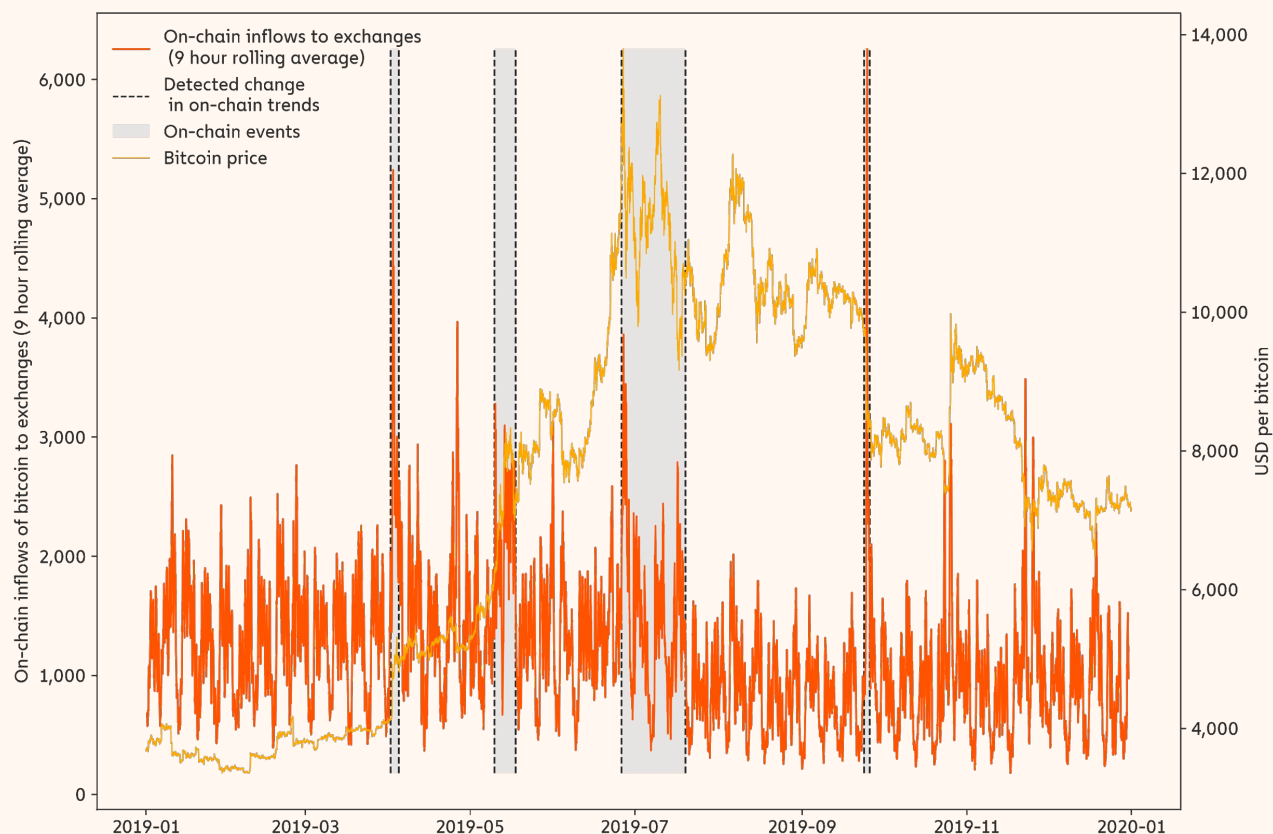
Identifying market events

The causes of extreme market events in cryptocurrency can feel very mysterious. Yet cryptocurrency markets have a vast amount of data. Unlike traditional markets where only trading activity is available, we can see both cryptocurrency trading on exchanges and the on-chain movements of assets in and out of exchanges. A combination of this data can help us understand when market events are likely driven by a small number of people moving large amounts of assets in and out of exchanges or by news (such as the announcement of Libra), or if more detailed investigation is needed to fully understand causes.

To investigate the causes of market events, we first need to identify when there is a change in trend rather than a one-off fluctuation. We apply a change point detection algorithm to on-chain inflows of bitcoin to the several hundred exchanges we cover at Chainalysis. On-chain inflows increase the supply of cryptocurrency available for trading on an exchange, so if there is a change in trend then trading conditions will need to adjust. If inflows increase, more cryptocurrency is available to be sold, while if they decrease, less is available. It takes time for traders to adapt to these changes, and prices may be volatile in the meantime.

In 2019, the algorithm detected eight extreme changes in the trend of inflows, as shown in Figure 1 below. When these occur close to each other, it suggests that an extreme event is occurring on-chain, shaded in grey, after which on-chain inflows resume a normal trend. These on-chain events often, but not always, coincide with major price changes.

Figure 1: on-chain inflows to exchanges versus price



Not all changes to on-chain inflows are market events. There appears to be a natural cycle to inflows, presumably as traders move assets between exchanges for arbitrage and to their own wallets for security. Furthermore, bitcoin is not necessarily sold as soon as it is deposited on an exchange. Traders can wait to sell and may have to wait for a number of blockchain confirmations before they can sell.

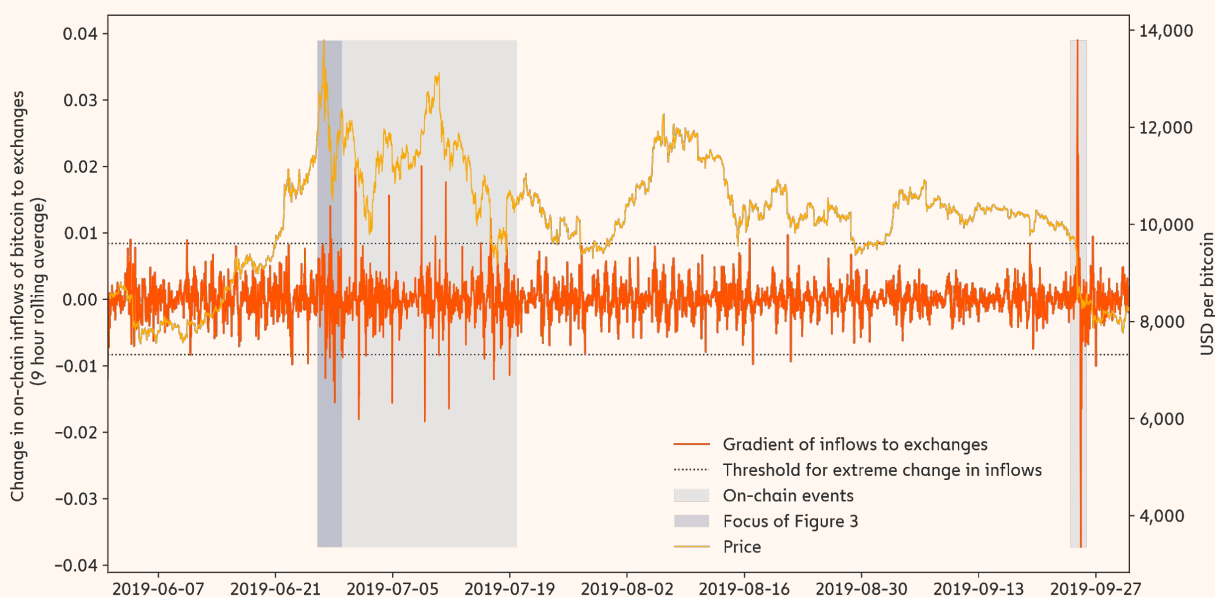
Some price changes do not coincide with an algorithmically identified on-chain event. An example of this was Xi Jinping's speech on 24 October about the importance of blockchain and the need to accelerate the development of the technology in China. Such news primarily changes views on the long-term prospects of cryptocurrency, resulting in a rapid, demand-led, change in price. While there was an on-chain response to the news – inflows increased after the announcement, presumably from people keen to sell at the new, higher price – it did not appear to have significantly affected on-chain inflows, which usually appear to be linked to short-term changes in the market. Indeed on-chain flows continued their trend and the price increase from Xi Jinping's speech was not sustained.

Reconstructing a market event

Yet the coincidence of on-chain events and major price changes is both logical and occurs frequently. To investigate this further we look in more detail at a four month period, June to September 2019, which contained two on-chain events. The first event coincides with the price decline following the rally after the Libra announcement on 18 June, and encompasses a 24 day period of both on-chain and price volatility. The second event coincides with a price fall of more than \$1,000 on 24 September.

In these four months, as shown in Figure 2, we look at the increase or decrease in inflows (smoothed by a 9 hour rolling average) and calculate the times when the change varies from its average by more than three standard deviations. The periods identified as events by the change point detection algorithm include numerous times of extreme change in inflows. This helps to explain why these periods are algorithmically identified as on-chain events. These inflows are so unusual that something very different from normal must be occurring.

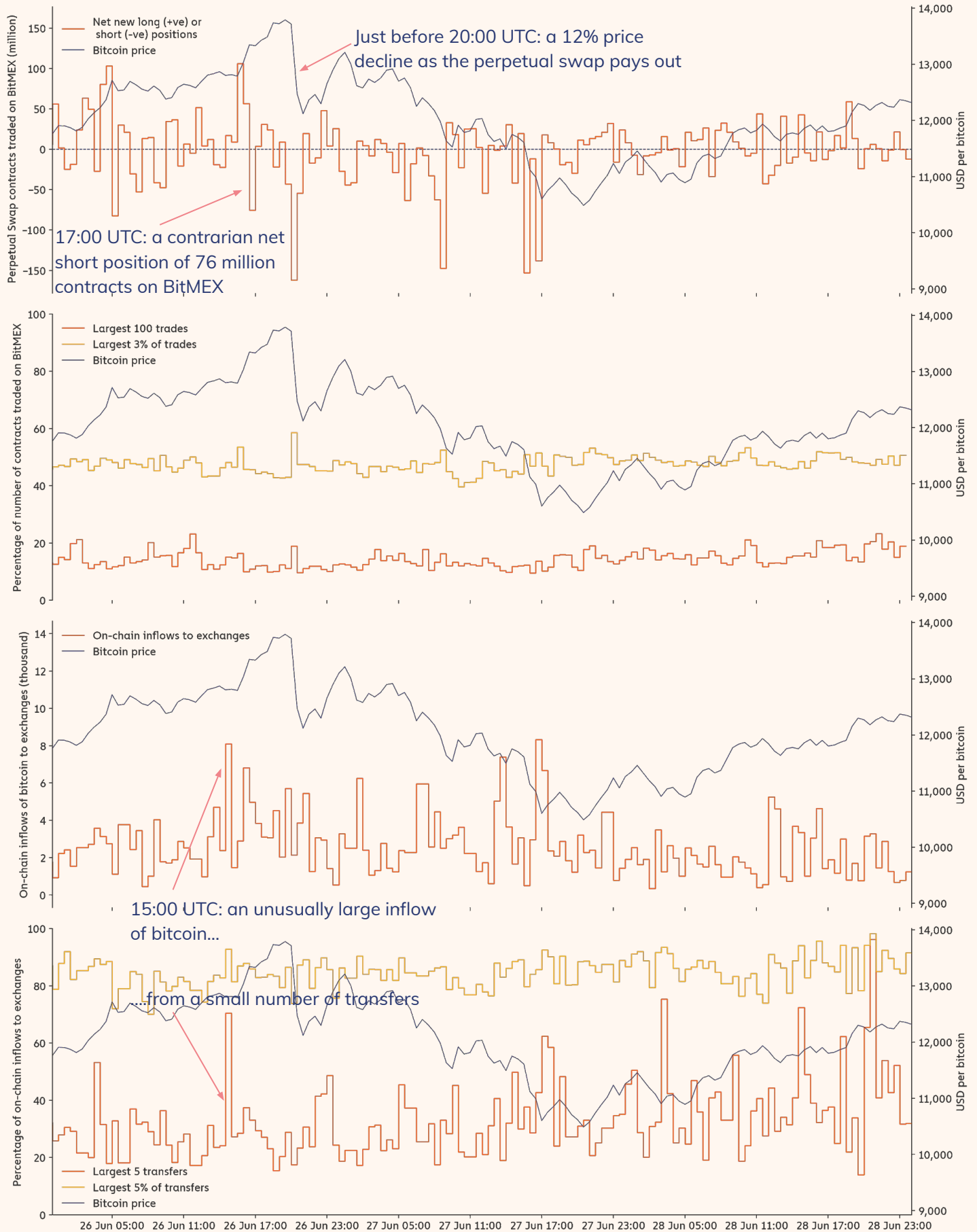
Figure 2: change in on-chain inflows to exchanges versus price



To understand what is causing such unusual behavior, we ask whether inflows are changing in response to unusual changes in demand, or whether demand is changing in response to unusual changes in inflows. To investigate this, in Figure 3 we focus on the first two days of the market event starting on 26 June, by looking, in 30 minute intervals, at:

1. Changes in long versus short positions on BitMEX, as the best indicator of market sentiment due to its liquidity
2. Whether these changes were due to a small number of trades
3. Total inflows to exchanges
4. Whether these inflows were due to a small number of on-chain transfers

Figure 3: long vs short positions on BitMEX, on-chain inflows to exchanges, and the degree of concentration of both activities



The first panel of Figure 3 shows that net new positions of BitMEX's popular perpetual swap contract generally match the price. When the price is falling, net new positions are generally short, and vice versa. This suggests that, naturally, beliefs about the price reflected in the perpetual swap market, which pays out every eight hours, at 04:00, 12:00 and 20:00 UTC, closely follow the price in spot markets, at least at a 30 minute view. However, there is an interesting moment at 17:00 UTC on 26 June, when net new positions go short, by 76 million contracts, while the price is rising, but three hours before the price falls by ~\$1,600, or more than 10%, right before 20:00 UTC.

The second panel of Figure 3 shows that the largest 3% of trades account for, on average, 48% of the total number of perpetual swap contracts traded on BitMEX, while the largest 100 trades account for 14% of the total, suggesting that no single player moves the market. This is actually a relatively low degree of concentration in cryptocurrency, where typically a (very) small number of people generate most of the activity. Furthermore, the degree of concentration is relatively constant over time, suggesting that participants rarely make extremely large trades. However, the concentration of trades is a lower bound of the concentration of the market, as an individual trader may be making multiple trades, and the size of trades should be limited by the depth of the order book.

The third panel of Figure 3 shows the on-chain inflow of bitcoin into all exchanges. This ranges from 350 to 8,440 bitcoin per 30 minutes in the three day period, with an average of 2,560 bitcoin. There is an interesting moment at 15:00 UTC on 26 June, two hours before the contrarian short position discussed above, where exchanges received 8,100 bitcoin within 30 minutes, more than three times the average.

The fourth panel of Figure 3 shows the percentage of on-chain inflows to exchanges from the largest transfers, similar to the second panel but for on-chain transfers rather than trades. The largest 5% of transfers account for, on average, 85% of the on-chain inflows, while the largest 5 transfers account for 33%. This is a high degree of concentration and there are times when it becomes even more concentrated. As a consequence, a small number of players are very influential. This is also a lower bound, as a transfer is the movement of value from one address to another and a person can control multiple addresses. One of the times of greatest concentration is at 15:00 UTC on 26 June, when 70% of the 8,100 bitcoin is deposited on exchanges by the five largest transfers.

The data suggests a sequence of events:

1. 15:00 UTC: an unusually large inflow of bitcoin from a small number of transfers
2. 17:00 UTC: a contrarian net short position of 76 million contracts on BitMEX
3. Just before 20:00 UTC: a 12% price decline as the perpetual swap pays out

In this situation, we see an unusual change in supply on exchanges, from a large concentrated inflow, an unusual change in demand, a contrarian short, and a sudden, large price decline.

This may be coincidence. Cryptocurrency markets are fragmented and immature, and on-the-ground experience is often required to interpret data. However, there have been past concerns that traders make large concentrated trades on spot markets that are constituents of the price indices used by derivatives exchanges. They may do this to benefit from leveraged bets that the price will fall, which is close to a certainty when a large amount of bitcoin is sold on a relatively illiquid spot market.

Diving deeper to the exchange and transfer level

On-chain data can help test the validity of these concerns by looking at inflows to specific exchanges. A challenge is that when there is a significant price change, inflows to all exchanges increase as traders respond. So we want to identify the exchanges that experience an unusually large inflow earlier than other exchanges. To do this, we individually analyze each exchange's inflow for the time period of interest and identify the one with the greatest change in inflow at the earliest time.

Figure 4 shows that on the 26 June, an exchange that is a constituent of BitMEX's price index experienced a large and early increase in inflow relative to all other exchanges.

Figure 4: time of peak inflow to exchanges

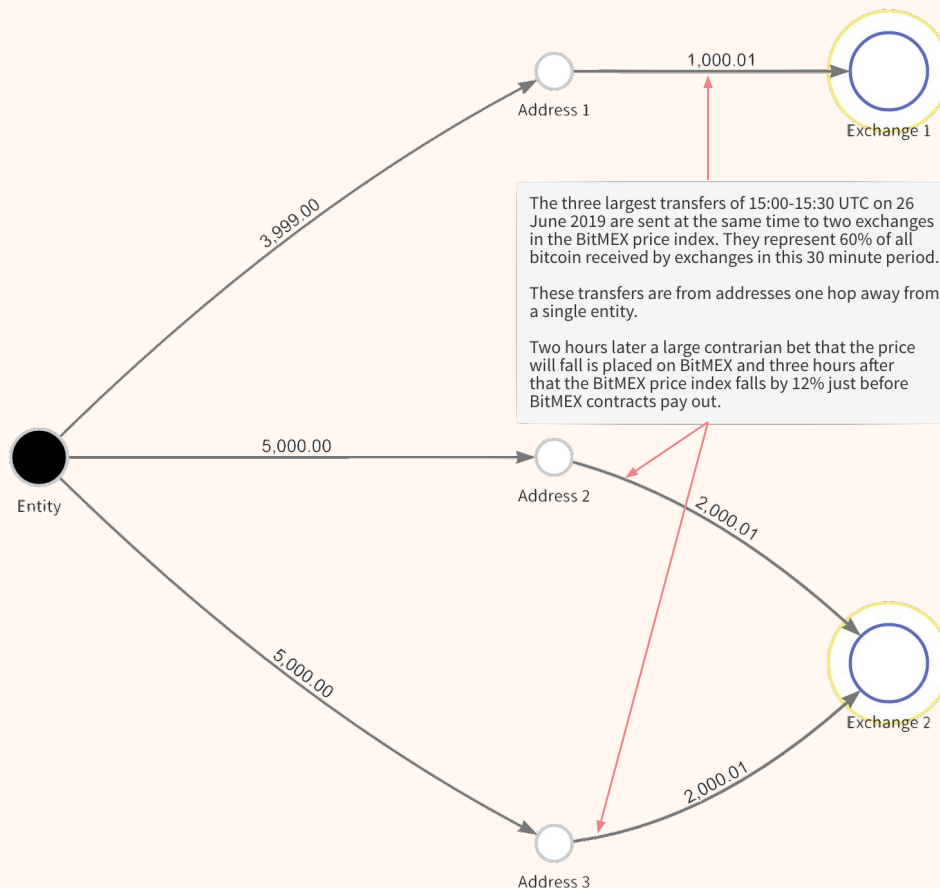


That a constituent exchange in the BitMEX price index experienced a large and early increase in inflow relative to all other exchanges does not confirm that the sequence of events was coordinated. For example, the exchange did not account for all of the increase in inflows. This may also be less of an issue in the future, as derivatives exchanges have recently increased the number of exchanges included in their price indices.

We can however go even deeper. In particular, individual transfers can be investigated in [Chainalysis Reactor](#). Figure 3 showed that from 15:00 to 15:30 UTC on 26 June, exchanges received 8,100 bitcoin within 30 minutes, and that 70% of these bitcoin were deposited on exchanges by the five largest transfers.

Figure 5 shows that if we investigate these five transfers, the three largest are sent to two exchanges, both constituents of BitMEX's price index, at exactly the same time — and are from addresses highly likely to be controlled by a single entity as they are just one hop away, suggesting that this market event was coordinated.

Figure 5: Chainalysis Reactor graph of the three largest transfers into exchanges of 15:00-15:30 UTC on 26 June 2019



On-chain data provides a unique insight into cryptocurrency markets that is not available in traditional markets. In cryptocurrency, you do not have to rely only on trading data, which may [not be accurate](#). On-chain data exhibits patterns that can be algorithmically analysed to identify when a market event occurs. This is valuable guidance in such a volatile market. On-chain data can then be used to reconstruct a market event, with a level of transparency not available in trading data, so that possible causes of the event can be identified. As the current market recovers, we believe that such insight will be key to making the right decisions. If you would like to discuss how Chainalysis can be of help please contact us at markets@chainalysis.com.