

CryptoMarketRisk

Market Analysis – Spring 2020

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A selection of articles writing in Spring 2020 from the Medium account for the CryptoMarketRisk team in the QFIN research group at the University of Sussex Business School.

All views are solely those of the authors.

Please consider the environment before printing this.

A Commentary on Market Abuse During the Financial Meltdown

US equity profits since Trump's reign began have been wiped out in a few weeks. Still, fueled by despicable greed, we are witnessing financial market manipulations on a scale and frequency that have never been seen before. The lack of integrity by a few powerful banker and asset managers is causing a major financial market melt-down from which the current form of our global economy may never recover.



Notes: The Market Abuse Directive (MAD) of the EU is not enforced on the US. Instead, oversight of the tactics deployed to move asset prices by manipulating financial derivatives is the responsibility of the Commodity and Futures Trading Commission (CFTC). To be as "MAD as a March hare" is an English idiom derived from the observed antics during the March breeding season of the *Lepus Europaeus*. March Madness is an allusion that can refer to any other similarly excitable and unpredictable manner of behaviour.

As Spring emerges on the northern hemisphere, an epidemic of misconduct has developed in financial markets. Under the various international laws about market abuse,[1] surveillance teams in trading companies all over the world should be reporting the more obvious manipulative trades to those responsible for particular markets. For the CME COMEX futures, that is the CFTC.

But regulators have insufficient firepower to stop the corrupt few using this massive melt-down as an excuse to get up to their old tricks. In some markets like crypt, almost all trades are on unregulated derivatives exchanges so there is nothing to stop prices being driven to zero so that there is no safe haven anymore. The only investments that hold their value against this tirade of abuse are dollar assets.

The CryptoMarketRisk team have been recording some of these trades, focusing on the two most obvious markets that are being manipulated, gold and bitcoin.

This article summarizes a week-by-week commentary of some of the more obvious and/or bizarre events:

Week 1 (19 to 23 Feb)

- The S&P 500 started with a moderate decline, and gold immediately picked up, gaining 4% as equities fell 4.5% in the same period. Of course. Gold is a safe-haven asset, [isn't it?](#)
- Bitcoin fell almost 20% in the same period. While Asian traders slept, at 21:42 UTC on 19 February a tsunami of selling pressure hit the BitMEX perpetual - a leader in bitcoin price discovery[2] and the spot price plummeted while Deribit option market makers stopped offering long traders the insurance of [out-of-the-money puts](#). But bitcoin is always doing its own thing, right?

Week 2 (24 Feb to 1 March)

- It's official. The worst week for global stocks since 2008. By the end of this week the S&P 500 is down 12%. Equity funds start panicking. Where are they going to get their return now?
- Just as US markets open on Friday 28 February massive sell orders worth a combined total of approximately \$3 billion hit the April and June COMEX gold futures contracts; at 12:30 GMT (13,000 contracts) and at 13:44 GMT (18,000 contracts), when the usual order size for gold futures is around 15 contracts at the very most. Not surprising then that gold fell by 6%, see [our article](#). Bitcoin is down only 9%, which is not massive for bitcoin.

Week 3 (2 to 8 March)

- On Monday 2 March the S&P 500 recovered briefly while gold and bitcoin moved sideways. Everyone is waiting for the Federal Reserve's response to last week's events. What does the good old US of A need to save its day? Yup, another round of quantitative easing. In the past, selling another batch of long-dated Treasury bonds (mainly to foreign investors [3]) has always bolstered the dollar and given the Fed and the banks enough cash to put back the buying pressure on US stocks.
- On 3 March the Fed announces the interest rate cut that will send the price of US Treasuries to sufficiently high levels to attract foreigners to fuel the ever-rising US debt – they hope.
- On the same day, G7 finance ministers and central bankers have a teleconference to discuss how to limit the impact of the COVID-19 pandemic on the global economy.
- Then the S&P 500 blasts through its previous short-term support levels of 3,000 and 2,950 points, closing the week down another 5.25% loss.
- On the same day, there is a massive buy-back in the April and June gold futures contracts, this time an order for 10,000 contracts in one trade, at 15:01 GMT (so again just as US markets open), see
- On Friday 8 March the COMEX copper futures May - July spread is driven up and then down, a sort of pump and dump on steroids, just for about 5 minutes before settlement time. Probably, this wasn't the only massive market manipulation that Friday afternoon. [comments welcome!]

Week 4 (9 to 15 March)

- The S&P 500 moves sideways on 9 and 10 March, gold and bitcoin drop 0.6% and 13% respectively. On 9 March, our [OTM put-call ratios](#) for Deribit bitcoin options stayed well below 1. This means that informed bitcoin traders are still anticipating sharp price declines. But our [bitcoin VIX](#) indices are unphased, staying at their recent levels around 60%
- Then on 11 and 12 March the S&P 500 crashes to new lows (just below 2,500 points) with a loss of 8.75%. On 11 March gold and bitcoin drop 1.5% and 5%, but on 12 March the Fed's takes action and the great gold sell-off begins with gold losing 4%. On 11 March (very late after

midnight GMT) and on 12 March (in the early hours of the morning GMT) there is huge selling pressure on the BitMEX perpetual with several spoofing orders (each with the BitMEX maximum size of \$10 million) deep in the sell side of the order book are trying to drive bitcoin's price down. And a little later (at 10:37 GMT) unusually high volumes on the Huobi quarterly futures (\$120 million traded in one minute) and the BitMEX perpetual (\$80 million traded in one minute) accompany a 25% fall in bitcoin prices, see [our article](#).

- On Friday 13 the S&P 500 finally makes back some gains but still closes with a 3.2% loss since the beginning of the week. Gold and bitcoin lose another 2% and 11%. By 13 March our bitcoin VIX indices have reached all-time highs. The very short-term bitcoin VIX jumps to 200%, see [our index](#).

Week 5 (16 to 20 March)

- The Fed announces a \$700 billion repo operation on Sunday evening (15 March) but this does not calm the markets. Reasons why [are explained](#). The week started with the worst drop for US equities since 1987, triggering another circuit breaker on NYSE and a fall in major US stock indices of more than 12% by the end of Monday. On the same day the S&P 500 VIX index reached an all-time high of 84%. Bitcoin took another dip below \$5,000 but closed the day with gains.
- On Tuesday central banks and governments come up with even more stimulus: Donald Trump is pushing for an aid package of at least \$3 trillion and central banks around the world are slashing interest rates. US markets rebounded by the end of Tuesday, closing up more than 5%. There were also stock gains in Europe since France, Belgium, Italy and Spain banned short-selling following Monday's market plunge.
- On Wednesday fresh fears of an economic slow-down triggered another circuit breaker on the NYSE and more than 6% drop for Wall Street's main indices by the end of the day. The rush to liquidity caused by the repo sent the US dollar higher for the third consecutive day (the dollar index increased more than 5% during the week). Gold again failed to provide security for investors seeking a safe haven, going down together with the broader market on Monday and Wednesday. The S&P 500 VIX index hit yet another record, closing at 85.18%.
- On Thursday morning the ECB announced a €750 billion bond-buying program, which is followed by a volatile day on stock markets. However, the main equity indices managed to hold their ground and even managed some small gains by the end of the day. Gold also went up together with the stock markets, but only by 0.09%.
- Finally, Bitcoin continued on its rally today (Friday), having gained 30% since Monday. Markets in Europe also opened higher and US stock futures are showing some gains.

Carol Alexander, Michael Dakos, Daniel Heck, Arben Imeraj, Artur Lindmaa

Notes:

[1] Such as the EU's Market Abuse Directive (MAD)
<https://www.handbook.fca.org.uk/handbook/MAR/1/6.html?date=2016-03-07> Apt acronym!

[2] Alexander, C., Choi, J., Park, H. and Sohn, S., 2020. BitMEX bitcoin derivatives: Price discovery, informational efficiency, and hedging effectiveness. Journal of Futures Markets, 40(1), pp.23-43
<https://onlinelibrary.wiley.com/doi/abs/10.1002/fut.22050>

[3] <https://www.marketwatch.com/story/heres-who-owns-a-record-2121-trillion-of-us-debt-2018-08-21>

The Curious Case of Asset Correlations: No Safe Havens?

Global equity markets have fallen by 30% since the S&P500 plummeted from its all-time high in mid-February. This is already far worse than during the banking crisis on 2008/9.[1] But safe-haven assets like gold and bitcoin are falling too. What can explain this bizarre behaviour?



S&P 500 index (blue), gold spot price (orange) and the price of bitcoin (yellow) 19 Feb to 13 Mar

Historically, investors protect their returns during times of turmoil by switching into safe-haven assets, so-called because they normally have low or negative correlation with equities. For instance, between 15 September and 15 October 2008 the correlations between the S&P 500 index and gold, or the Swiss Franc, or US Treasuries were all around minus 40%.

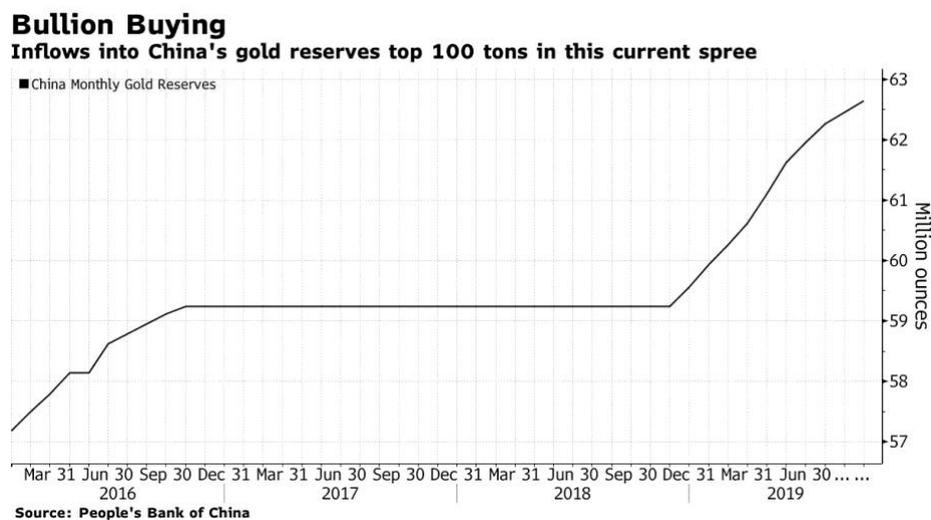
US stocks have been crashing violently for the past five weeks, so much so that NYSE had to trigger 'circuit breakers' to halt trading for 15 minutes on several occasions when the S&P500 crashed more than 7% in a few minutes. Why? The short answer is the ill-preparedness of the US against the COVID-19 pandemic. A longer answer includes significant decreases in the projections for global GDP, US company earnings, airline passengers, global supply chains' capabilities all set against a backdrop of huge political uncertainty as President Trump makes unilateral decisions which send after tremors around the world.

As funds flow out of equities one would expect demand for gold and bitcoin to increase. But this time around, safe havens have behaved completely differently. Indeed, gold and bitcoin have all fallen at the same time as US equities, as can be seen from the chart at the top of this page. During the last month the correlation between the S&P 500 and the price of bitcoin has been plus 63% and with the price of gold the S&P 500 has a correlation of plus 20%. And the dollar was also falling (with a correlation of 17% with US equities) until stopped (at least temporarily) amid the unprecedented repo operations of the Federal Reserve – of which we have much more to say below.

Since 2008 most central banks have raised cash by issuing government securities (typically, long-term bonds) and selling them to other government agencies that have too much cash (e.g. tax-collection agencies) but mainly to domestic and foreign investors. For instance, given the latest information available from SIFMA the US government has about \$19 trillion debt of which about \$7 trillion is held by foreigners and of that over \$2 trillion is held by China and Japan.[2]

To buy US assets one needs US dollars. So foreign holders of US debt help the US economy in another way too, by boosting the value of the dollar and making imports less expensive.

However, in 2019 President Trump escalated a trade war between the US and China and as a result the Chinese and other central banks started to diversify their reserves away from the US dollar.[3] In other words, foreign governments don't want to buy US debt anymore. Many countries, such as Russia, would rather buy gold. [4] And, as can be seen from the figure below, during 2019 the People's Bank of China increased their (already very large) gold bullion reserves by almost 6%. Bloomberg reports this as a direct consequence of Trump's Trade War. [5]



Given the lack of demand for US government securities, and hence also the US dollar, in September 2019 the Federal Reserve re-introduced repurchase (repo) operations for the first time since the 'great financial crisis'. That is, they buy their own securities from banks, hedge-funds and any other financial institutions that have a lot of securities but not enough cash.[6] This way, they can inject some liquidity into the financial markets for a limited period.

The repo operations in 2019 had an initial value of about \$200 billion and each repo was only for a very short period (overnight, or up to 14 days). But the Fed's announcement on 12 March 2020 sent shock waves through the global financial system. In their Statement Regarding Treasury Reserve Management Purchases and Repurchase Operations the Federal Reserve announced: [7], [8]

"Today, March 12, 2020, the Desk will offer **\$500 billion** in a three-month repo operation at 1:30 pm ET that will settle on March 13, 2020. Tomorrow, the Desk will further offer **\$500 billion** in a three-month repo operation and **\$500 billion** in a one-month repo operation for same day settlement. Three-month and one-month repo operations for **\$500 billion** will be offered on a weekly basis for the remainder of the monthly schedule. The Desk will continue to offer at least **\$175 billion** in daily overnight

repo operations and at least \$45 billion in two-week term repo operations twice per week over this period.”

Between 13 March and 13 April this year, numerous tranches of \$500 billion cash will be injected to banks (and hedge funds and mutual funds and any holders of government debt) with repurchase dates up to three months ahead. That is, around 3 trillion dollars are essentially being printed so the Fed can buy its own debt for the sole purpose of injecting liquidity into US markets – that is giving the baying wolves of Wall street rather a lot of cash to buy US stocks.[9]

Gold just had its worst week in 8 years, when it should have been its best, because somebody has been dumping huge naked shorts on COMEX gold futures ... [again](#). It is easy to bash gold this way, particularly because the futures are physically settled and so their price (which leads the spot price) needs bear no relation with the amount of bullion actually held. So far this month we’ve had two huge Friday-afternoon spoofs on COMEX aimed at selling high and buying back low the next week.

Trump doesn’t want the physical gold price to plummet because Fort Knox has almost as much gold as China.[10] However, Trump does not like bitcoin at all. This is not surprising because it is an existential threat to the dollar.

And so, bitcoin, originally termed ‘digital gold’ because of its safe-haven properties, has been bashed to within an inch of its life. Its price fell from over \$10,000 in the middle of February to less than \$5,000 in the middle of March. It remains hugely volatile, regaining ground as the bulls return, only to fall again 50% in the space of a week. The 7-day bitcoin VIX even reached 200% recently [see [index](#)]. Trading is being driven by some pretty obvious manipulation bots on the main bitcoin derivatives exchanges, especially [BitMEX](#).

It is not that easy to bash COMEX gold futures which are, after all, supposed to be under the watchful eye of the CFTC. But bashing bitcoin is simple. Child’s play for the wolf cubs. The exchanges aren’t even regulated. Officially, US investors are banned from trading on them, but it is actually possible to trade on the biggest bitcoin derivatives exchange under the radar and there is evidence that this has been happening recently on quite a [large scale](#).

Large US asset managers (and the other wolves) may have become complacent from the decade-long almost linear upwards trend in the US equity market [11]. But now they must find returns some other way. I hypothesize that they started bashing US stocks to, effectively, hold the Federal Reserve to ransom until it came up with the cash the only way it knew how – repo – and on a scale never seen before.

Now that the wolves have their cash there is a huge temptation to get up to their old tricks. The unprecedentedly widespread market turmoil keep the CFTC very busy, so it is much easier for their antics to remain below the radar of regulators. Could it be that bashing gold and bitcoin is their way of saying thank you for the cash? Whatever the reasons, it seems abundantly clear by now that there is no alternative. There is no safe haven. Only by holding the US dollar and US assets will global investors make positive returns.

We are watching. Looking for the naked COMEX shorts, and the signals from the option traders, and for the whales to surface, and for the funds to appear on BitMEX, and for the bots to appear in the order books.

Carol Alexander

Notes:

[1] The MSCI world equity index was at 2,431 points on 14 February 2020, falling to 1,702 one month later by 16 March (down 30%). By contrast it was at 1,236 when Lehman Bros. filed for bankruptcy on 15 September 2008, reaching 950 points by 15 October (down 23%).

[2] <https://www.sifma.org/resources/research/us-treasury-securities-holders/> and <https://ticdata.treasury.gov/Publish/mfh.txt>

[3] <https://www.reuters.com/article/us-usa-treasury-securities/china-holdings-of-u-s-treasuries-in-april-skid-to-nearly-two-year-low-idUSKCN1TI2RA>

[4] <https://www.ft.com/content/8148a8f0-2479-11e9-8ce6-5db4543da632>

[5] <https://www.bloomberg.com/news/articles/2019-10-07/china-s-gold-buying-spree-tops-100-tons-amid-prolonged-trade-war>

[6] But only for a short period such as one day (i.e. overnight repo) or 14 days. At the end of the repo period the bank (or hedge fund) repurchases it. Repos were originally an operation to sell short, by borrowing the asset (via an intermediary called a repo broker) and then selling it on the market, hoping to buy it back at a lower price before returning it to the original owner, via the broker, on the agreed date. Repo rates are charged so that the broker and the owner receive a small fee. The operator hopes that the fall in price of the asset will cover the repo rate, so he makes a profit.

[7] https://www.newyorkfed.org/markets/opolicy/operating_policy_200312a

[8] [Here](#) is a good explanation of how repo works, what happens when the repo rate dislocates from the benchmark Fed funds rate and how this new repo operation differs from standard QE .

[9] <https://www.brookings.edu/blog/up-front/2020/01/28/what-is-the-repo-market-and-why-does-it-matter/>

[10] https://en.wikipedia.org/wiki/United_States_Bullion_Depository

[11] For instance, after the banking crisis of 2008-2009, the value of the S&P 500 on 19 February 2010 was 1,109 points and its all-time-high value exactly one decade later was 3,386. That's an average annual return of 13%. The risk-adjusted return (information ratio) was a whopping 0.92 based on weekly data over these 10 years. It would be little wonder if they did get complacent, if a little bored perhaps.

[12] <https://www.amazon.co.uk/Corruption-Fraud-Financial-Markets-Manipulation/dp/1119421772>

Roller Coaster COMEX Tycoons are Manipulating the Gold Price

US stocks are crashing so the prices of 'safe-haven' assets like gold should be going up.
Except they are not.



Figure 1: Spot Price of Gold and the S&P 500 Index, 19 February to 13 March 2020

Purchasing gold is the tried and tested solution to a global market meltdown and it worked just fine last time. During the worst month of the 2008 financial crisis the correlation between daily returns on the S&P 500 and gold was minus 41%. That is, when US stocks go down gold goes up.

But during the past month, indeed the worst month for the US stock market since 2008, gold's [correlation](#) with the S&P 500 has been plus 20%.

Figure 1 shows the S&P 500 index in blue (right-hand scale) and the gold spot price in yellow (left-hand scale). The only periods when the S&P 500 stopped falling coincided with sharp falls in the gold which were, typically, timed just a few hours before markets closed for the weekend. In just a few hours of frenetic futures trading on Friday 28 February, the spot price of gold fell by more than 5%. It recovered on 3 March, jumping up 3% between 09:36 and 12:21 CDT. But the subsequent rally was short-lived. On 12 March (the worst day on global financial markets since 1987) it fell by more than 4.5% and on Friday 13 March it fell by another, whopping 3.86%.

What can explain this bizarre and atypical behaviour of the gold price? Here are some of the usual excuses:

“Investors are so fearful, they’d rather hold onto cash”
Adam Koos, President of Libertas Wealth Management Group [1]

or:

“We attribute this to forced selling aimed at offsetting losses elsewhere and covering so-called margin calls”

Carsten Fritsch, analyst at Commerzbank [2]

We don't believe either of those reasons.

On 28 February some single trades that are so large as to move prices are displayed in COMEX transactions listed below. These contravene the laws about market abuse in the US (and in other countries, such as the EU Market Abuse Directive). [3] They should be broken into small trades and executed in an orderly and optimal fashion to lessen their impact on prices. Any trades of this type should be reported to regulators and they should impose strict fines. [4]

COMEX Gold Futures Tick Data

Source: Reuters

Gold June Futures	Price	Volume	Gold April Futures	Price	Volume
28/02/2020 07:25	1632.5	1	28/02/2020 07:25	1626.8	1
28/02/2020 07:25	1632.2	1	28/02/2020 07:25	#N/A	15
28/02/2020 07:25	#N/A	2400	28/02/2020 07:25	#N/A	2400
28/02/2020 07:25	#N/A	83	28/02/2020 07:25	#N/A	83
28/02/2020 07:26	#N/A	3	28/02/2020 07:27	1625.7	1
28/02/2020 07:27	#N/A	2499	28/02/2020 07:27	#N/A	2499
28/02/2020 07:27	#N/A	1587	28/02/2020 07:27	#N/A	1587
28/02/2020 07:27	#N/A	6	28/02/2020 07:27	#N/A	6

Gold June Futures	Price	Volume	Gold April Futures	Price	Volume
28/02/2020 08:43	1629.1	5	28/02/2020 08:43	1623.8	1
28/02/2020 08:43	#N/A	2499	28/02/2020 08:43	#N/A	2499
28/02/2020 08:43	#N/A	2499	28/02/2020 08:43	#N/A	2499
28/02/2020 08:43	#N/A	222	28/02/2020 08:43	#N/A	222
28/02/2020 08:44	#N/A	26	28/02/2020 08:43	1623.8	2
28/02/2020 08:44	1629.8	2	28/02/2020 08:44	1623.8	1

Figure 2 zooms in on CME's COMEX gold futures prices. [5] We have selected this market because it was long ago established as being the price leader of all gold markets. [6] The figure depicts minute-level close trading price on the prompt (April) futures, between 27 February and 5 March 2020. The initial price drop on 28 February happened after a coordinated sell-off with 19,849 contracts for April and June futures exchanging between 07:26 and 07:31 CDT. About 2 hours later some excessively large single trades on April and June futures were executed milliseconds apart: 2 sets of block trades of 2499 contracts and 1 block of 222 contracts (2499 contracts are worth c.a. \$450 million). Given that these block trades accounted for about a quarter of the total trading volume on 28 February, it isn't surprising that the spot price of gold dropped \$80, from \$1650 to \$1570 – almost 5%.

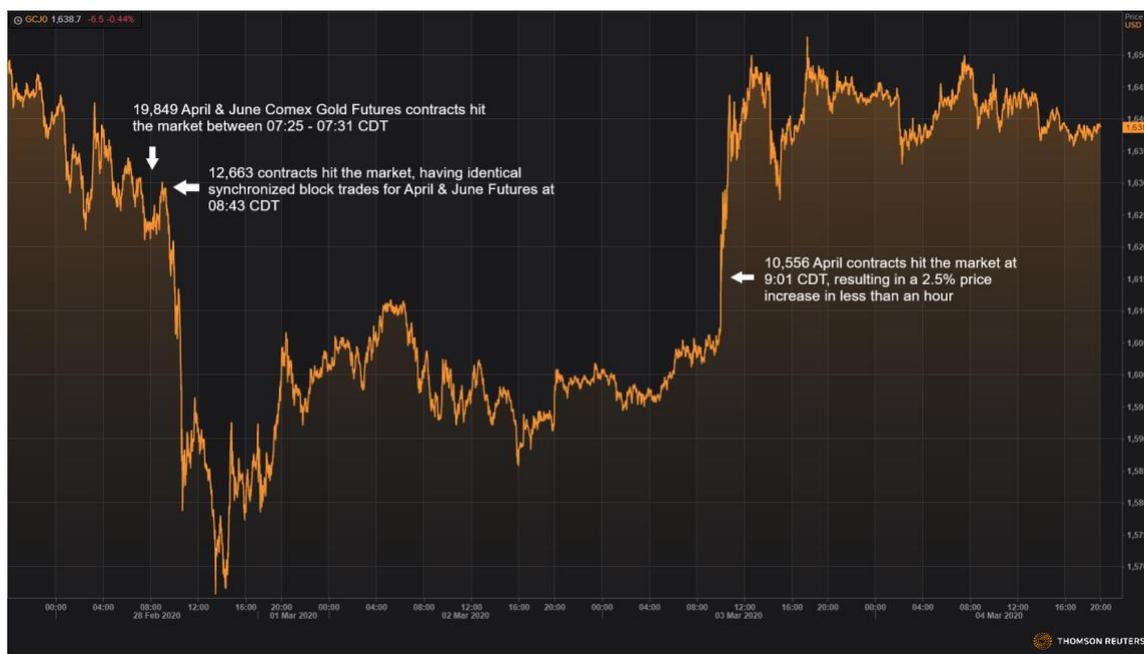


Figure 2: Annotated Chart of Spot Gold Price, 27 February to 5 March 2020

On March 3 another spike in market activity occurred, but this time in large buy orders which were nevertheless executed according to the rules on market discipline. At 10:01 CDT the trading volume on the April contract jumped from its normal level of a few hundred contracts per minute to 10,056 contracts at \$1,614 (worth \$1.6 billion). This was followed by a 2.5% price jump up, in exceptionally heavy trading for 30 minutes. The gold bulls returned, pushing its price back up to \$1,700 by 9 March. But bears are particularly effective at moving prices on Friday afternoons. As can be seen in Figure 1, the gold price dropped again during the afternoon of 13 March and continued to do so after S&P 500 closed, resulting in total daily fall of more than 3%. Gold had its worst week in seven years.

A nearly identical manipulation has been documented by Paul Craig Roberts and Dave Kranzler. [7] These authors claim that the Federal Reserve instructed its bullion dealer's to sell over 4,900 gold contracts on the Globex system in a 2-minute period from 02:40 to 02:41 EST resulting in a \$24 decline in the price of gold. The evolution of the spot price thereafter displayed an almost identical pattern to the one shown in Figure 2. Why were these orders not executed in an optimal manner? Normal conduct is for any large order to be broken into smaller parts, in order to minimize its impact on the market price. But these very large orders are deliberately aiming at quite the opposite effect. According to the Market Abuse Directive the type of painting the tape on COMEX futures that we have depicted in this article is a manipulative act, but nevertheless it is common behaviour. If this were happening in the UK we could request that the FCA investigates the potential for suspicious trading activity. [8] But because it is in the US one might whistle blow to the CFTC. [9]

Carol Alexander & Artur Lindmaa

Notes:

[1] <https://www.marketwatch.com/story/why-golds-plunge-proves-its-a-safe-haven-asset-2020-03-12>

[2] <https://www.ft.com/content/4b23a140-59d3-11ea-a528-dd0f971febbc>

[3] <https://www.handbook.fca.org.uk/handbook/MAR/1/6.html?date=2016-03-07>

[4] For instance, in 2018 the CFTC ordered UBS to pay \$15 million as a penalty for manipulation of gold and silver futures on COMEX.

[5] <https://www.cmegroup.com/trading/why-futures/welcome-to-comex-gold-futures.html>

[6] Hauptfleisch, M., Putniņš, T.J. and Lucey, B., 2016. Who sets the price of gold? London or New York. Journal of Futures Markets, 36(6), pp.564-586.

<https://onlinelibrary.wiley.com/doi/abs/10.1002/fut.21775>

[7] P. C. Roberts & D. Kranzler's article in 2014 (<https://www.paulcraigroberts.org/2014/01/17/hows-whys-gold-price-manipulation/>) offers detailed explanations on how gold bullion dealers routinely manipulate the price of gold on the Federal Reserve's orders

[8] <https://www.fca.org.uk/markets/market-abuse>

[9] <https://uk.reuters.com/article/us-usa-cftc-enforcement/cftc-enforcement-fines-fees-jump-in-2019-even-as-activity-civil-penalties-fall-idUKKBN1XZ2BF>

Watch Out: Bitcoin Option Traders About

Option market makers are among the most knowledgeable and highly-informed traders on any underlying. We describe some simple indices for monitoring and learning from their behaviour.

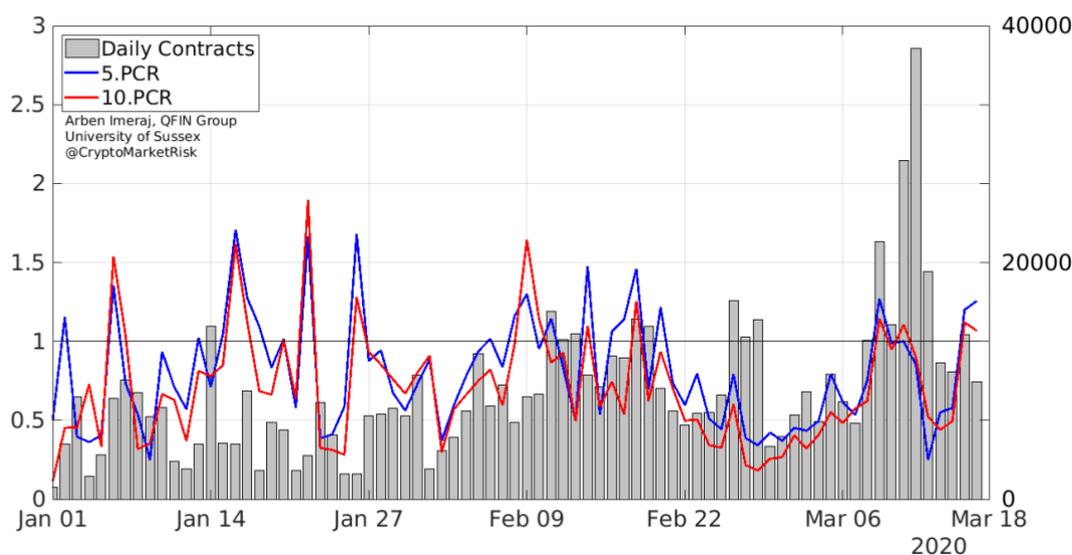


Figure 1: Deribit OTM Bitcoin Put-Call Ratio and Daily Option Contracts Volume

Deep out-of-the-money (OTM) put options are an insurance against a price fall. On the maturity date, which for bitcoin weekly options on Deribit could be just a few days away, one has the option to sell at a much lower price level than now. So you'll only exercise the option if there is a crash, i.e. the market price goes below the option strike.

Otherwise, the option expires unexercised. The market maker pockets a small premium on every deep OTM put option that is bought and, usually, that's the end of the story.

HOWEVER, when market makers see signs of an imminent crash, they stop offering these options. The market liquidity in deep OTM puts dries up. Of course, everyone wants to buy them to insure against the crash, but nobody is willing to sell them.

CryptoMarketRisk tracks the x% OTM Put-Call Ratio (PCR) with ticker x.PCR. This represents the relative volume of trades on low-strike options (OTM puts) and high-strike options (OTM calls). As x increases, the deeper OTM the options are.

The 5% and 10% OTM PCRs are shown in the figure above reported on a daily level since 1 Jan 2020. In side-ways markets one expects about the same volume on low-strike as high-strike options so this ratio should be about 1. Indeed, until the middle of February it was sometimes as low as 0.25 and sometimes as high as 1.75. But basically it was fluctuating pretty regularly around 1, or perhaps a little less (because of the skew).

The Deribit options total trading volume was growing from an average of less than 10,000 contracts in January to well over 10,000 contracts in the first half of February. This is shown in grey, aggregated

over all options traded on one day. Then something [happened](#). US equity markets started to nose dive. And bitcoin option market makers stopped writing OTM puts. The OTM PCR dropped below 1, quickly fell below 0.5 and stayed there until 9 March. There was a brief period when confidence in a bull period returned and the ratios peeped above 1 for a few days, but on Friday 13 March both the 5.PCR and 10.PCR indices dropped – as an all-time record daily volume of 40,000 contracts exchanged hands.

Bitcoin options market makers know what they are doing. They only write OTM puts when they expect to pocket the premium, not when they think they will get hit as the buyer of these option exercise their right to sell bitcoin above the market price.

Still, some are confident enough to write deep OTM puts again. For instance, over 2000 puts of strike 5000 and maturity 27 March 2020 were traded on Deribit on 16 March. This trader obviously forecasts a spot price of bitcoin above 5000 USD by the end of the month.

Hopefully, this is a good sign. Option traders are almost the most informed of all. Only the orchestrators of the recent, mammoth manipulative trades on Huobi futures and and BitMeX perpetuals know more. But thats another [story](#).

Carol Alexander & Arben Imeraj

Bitcoin VIX Signals Red Alert for Variance Swaps

Bitcoin VIX indices recently hit all-time highs. What sort of sums will the issuers of bitcoin variance swaps be paying to the lucky few who purchased them recently?

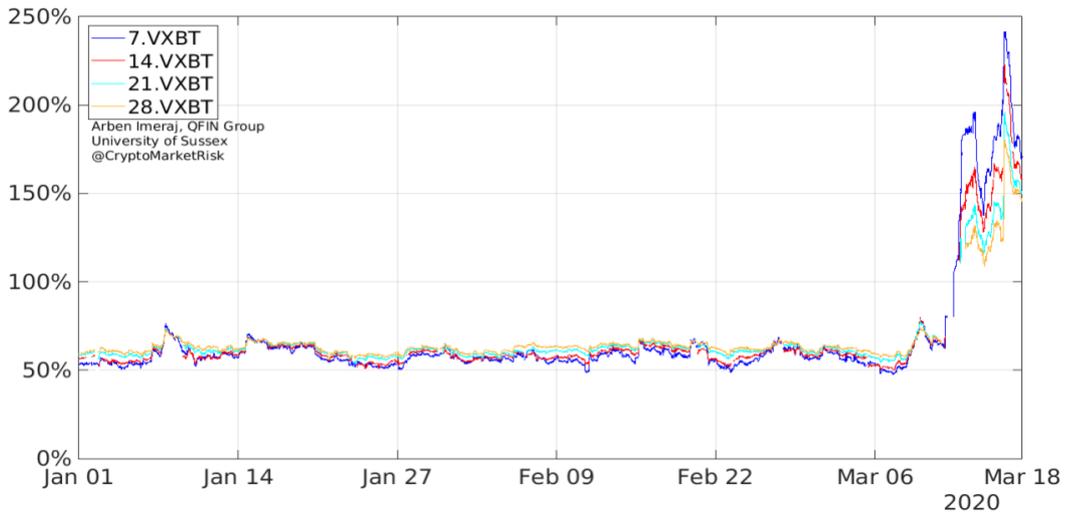


Figure 1: VXBT – Bitcoin Volatility Indices for Different Maturities

The greatest bitcoin bashing so far occurred in the early hours of 12 March during a [sell-off](#) on bitcoin futures and perpetuals exchanges, Huobi and BitMeX in particular. Options followed suit, as we can see from the CryptoMarketRisk ticker x.VXBT shown above, which represents the bitcoin VIX of maturity x days for x = 7, 14, 21 and 28.[1]

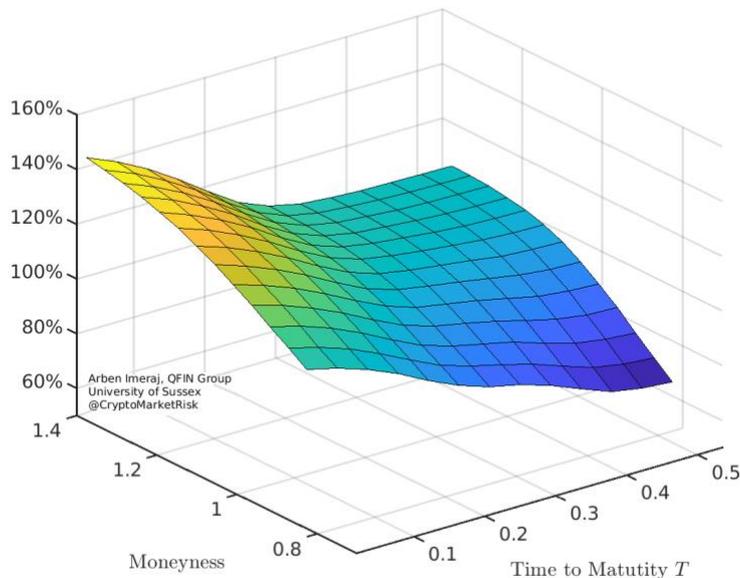


Figure 2: Deribit Bitcoin Options Implied Volatility Surface on 13 March at 12:00 UTC

These indices are derived from an implied volatility smile surface, such as that shown in Figure 2, which is another way to visualise the traded prices of options at a particular moment in time. [2] Typically, the option's moneyness (measured as K/S , where K is the option strike and S is the current bitcoin price) ranges from 0.75 (OTM puts) to 1.4 (OTM calls) and the maturity is up to 6 months ($T = 0.5$). [3]

Returning to Figure 1, from 1 Jan until 12 March the indices displayed a typical contango term structure, with only very brief periods of backwardation, fluctuating around the 60% level. For instance, the 28-day index at 60% is equivalent to monthly return standard deviation of a bit less than 17% -- or (very roughly) an expectation of $\pm 3 \times 17\% = \pm 50\%$ returns on bitcoin over the next 28 days. With 99% confidence.

But at 10:45 UTC 12 March the bitcoin price fell by more than 30% in less than [30 minutes](#), from \$8000 to \$5500. This precipitated a jump in the VXBT indices, first from 60% to 80% and then up to 140% within 2 hours. The further recent falls in bitcoin prices have sent the 7.VXBT to 250%!

First, the CBOE methodology is flawed. It is heavily tilted towards very low strike puts. These options, if written at all, can reach ridiculous prices when prices take a nose dive. In fact, the VIX index reflects nothing more than a widespread market panic at such times. That's why its called the '[fear gauge](#)'.

The 28.VXBT index is more presentative of real expectations about the evolution of volatility. Currently at 145%, that's a monthly standard deviation of 40%, or (very roughly) $\pm 120\%$ returns on bitcoin over the next 28 days. With 99% confidence.

Besides the information about volatility and expectations of returns, the VXBT indices can be used as fair-value strikes for bitcoin variance swaps, such as those offered by boutique structured product companies such as GSR.[4] These swaps have pay-offs defined by the difference between a floating 'realised variance' leg and the fixed swap rate. Issuing variance swaps is a risk business. The variance risk premium is typically negative because bitcoin investors are happy to pay for the insurance these swaps provide.

Most of the time, with VXBT remaining stable (at around 60% in the figure above) the variance-swap issuers will pocket a nice premium. When the swap terminates the settlement will be from the buyer of realised variance to the seller, e.g. GSR. However, when bitcoin markets nose dive, as they have just recently, the issuer have massive pay-outs to their customers.

For example, consider this 28-day variance swap, hypothetically agreed on 18 February as follows:

- The 28.VXBT index was at about 60% then, so let's assume the swap rate agreed was 60%
- Supposed the agreed notional was 250 USD vega

In other words, the pay-off from the issuer to the buyer, made when the swap terminates on 17 March, will be $250 [RV - 60^2]$ where RV is the realised variance, which is derived from the sum of squared daily log returns on bitcoin between 18 February and 17 March.

On 18 March, the swap settles. The RV turned out to be 200.[5] So the issuer of this hypothetical variance-swap has to pay the buyer:

$$250 [200^2 - 60^2] = 250 [40000 - 3600] = 9.1 \text{ million USD}$$

One heck of a big pay out for a vega of just 250 USD!

Issuing variance swaps is similar to writing OTM puts. But even more risky. Most of the time, the market maker makes a profit. [6] But when the underlying crashes they become liable for some huge insurance pay-outs. [7] No wonder the market for US equity variance swaps dried up during the 2008-9 financial crisis.[8]

Carol Alexander & Arben Imeraj.

Notes:

[1] These volatility indices mimic the CBOE VIX methodology. The VIX is widely accepted to represent S&P 500 option trader's expectations of volatility over the next 30 days. [The CBOE seem to have taken that interpretation off their website. But a google search on the term VIX brings it back everywhere else.]

[2] Put the traded price on the left of the Black-Scholes formula, use the option characteristics K (strike) and T (maturity) and forget interest rates, these are zero now anywaythen back-out the volatility that is implied by that market price.

[3] Options (typically deep OTM calls) with very low trading volume are excluded. Some OTM puts had over 2000 contracts traded on this day. The options used need sufficient volume on Deribit to avoid stale or artificial prices.

[4] See <https://medium.com/gsr-trading/introducing-cryptocurrency-variance-swaps-293724914c2b>

[5] Market convention is to quote RV as its square root in an annualised form, in percentage points. Put another way, the realised volatility was 200%.

[6] For instance, a swap with the same terms but agreed on 1 August with swap rate 100% (the 28.VXBT was 100.1% on that day) would have returned a profit of 1.34 million USD to the issuer, because the RV between 1 Aug and 29 Aug was 68%, so the pay-off was $250 [68^2 - 100^2]$ USD.

[7] Unless they are hedged. But that's another story.

[8] But they have come back, albeit with limited liability e.g. in the form of 'corridor swaps'.

What are bitcoin whales and why should we care?

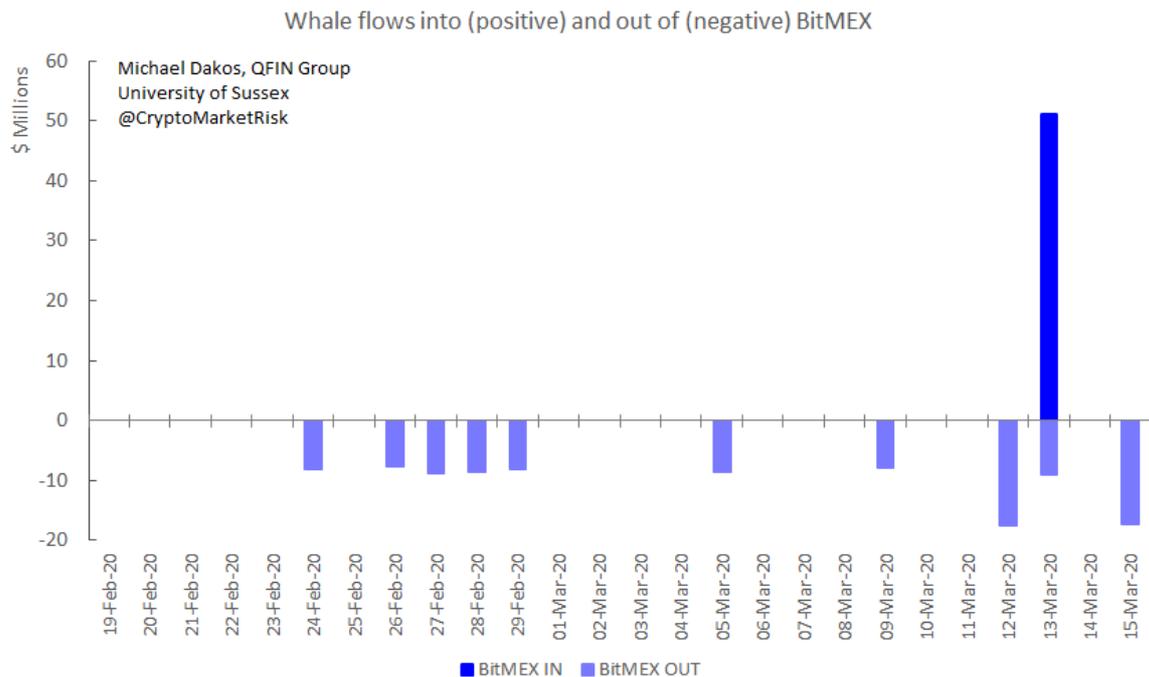
A total of \$370 million worth of bitcoin and tether were sent to BitMEX, Huobi and OKEx on the same day that bitcoin's price spiraled down to \$3,800.



The distribution of crypto assets is often uneven, resulting in some entities holding large proportions of a crypto asset's total supply. For instance, each one of approximately 9,000 addresses currently hold bitcoin (XBT) that is worth at least \$1 million. [1] Such entities are called 'whales' because they have the potential to cause sudden and massive price moves. Blockchain transactions from such whales are worth monitoring especially if the funds are sent to an exchange as this can be an indicator of imminent large price movements.

We use data from Whale Alert to retrieve such large transactions on several of the main crypto asset blockchains. [2] Whale Alert uses the dollar value of a crypto asset transaction to decide whether it is a whale transaction. For instance, any bitcoin transaction worth at least \$1 million from or to an identifiable entity is considered a whale transaction by Whale Alert. [3] During February and March 2020, very large trades were executed on BitMEX (on the bitcoin perpetual contract), Huobi (on the bitcoin quarterly futures expiring at the end of March) and OKEx (again on the bitcoin quarterly futures), so we focus on the on-chain transaction flows in and out of these three exchanges.

Looking at BitMEX, there was a massive inflow of bitcoin on Friday 13 March, on the same day that bitcoin's price hit a downward spiral all the way to \$3,800 with many BitMEX users losing funds via liquidations that 'should not have occurred'. [4]



BitMEX claims that this happened because of two Distributed Denial of Service (DDoS) attacks at 02:16 UTC and at 12:56 UTC that took their REST API down, but several users are disputing these claims. Zooming in on BitMEX on-chain inflows on 13 March, we see that 3,000 XBT (\$12,947,515) were deposited to BitMEX in a single transaction at 02:00:34 UTC and a further 5,000 XBT (\$22,131,398) were deposited at 02:10:37 UTC, mere minutes before the 02:16 UTC DDoS attack on BitMEX.

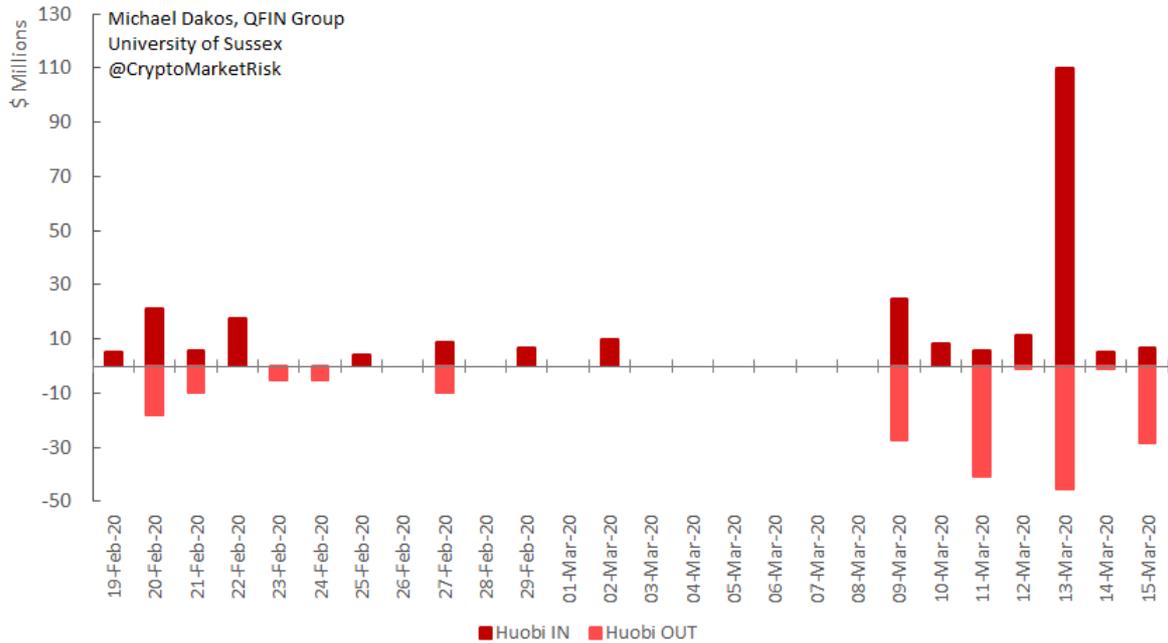
Moreover, another deposit of 3,000 XBT was made to BitMEX at 04:02:55 UTC, a little late for the 02:16 UTC DDoS attack but not to worry – the second DDoS attack on BitMEX came several hours later at 12:56 UTC, perhaps our whale needed a bit of sleep first.

Such DDoS attacks on exchanges often form part of a well-known price manipulation strategy. The attacker places a large sell market order on an exchange and then launches a DDoS attack, preventing other trades from being placed on the exchange. The large sell order is filled with existing bid volume in the order book, creating downward price pressure on the exchange. As no new bids arrive the price continues to drop to fill the large sell order and stop-loss positions begin to trigger, causing a downward price spiral. Finally, the attacker stops the DDoS attack so new orders arrive and buys a large position at a very low price.

This manipulation strategy can be seen in action by examining the trading and limit order books of the BitMEX bitcoin perpetual contract. It is also worth noting that while the maximum leverage permitted on BitMEX's bitcoin perpetual is 100x, there are reports that it is possible to synthetically create up to 700x leverage. [5]

Later in the day (13 March 2020) Huobi also saw massive crypto asset inflows and outflows, but in this case it is mostly tether (USDT) that flowed into Huobi. However, Huobi derivatives trades can only be funded with the corresponding crypto asset (e.g. a position on the XBT futures can only be funded with XBT, regardless of leverage). [6] These USDT inflows may have been directed at the Huobi spot market, but we do not observe significant trading volume or price action on the Huobi spot XBT/USDT pair or on any other of the main tether-based Huobi spot pairs. [7] We therefore examine all USDT flows on 13 March for good measure:

Whale flows into (positive) and out of (negative) Huobi

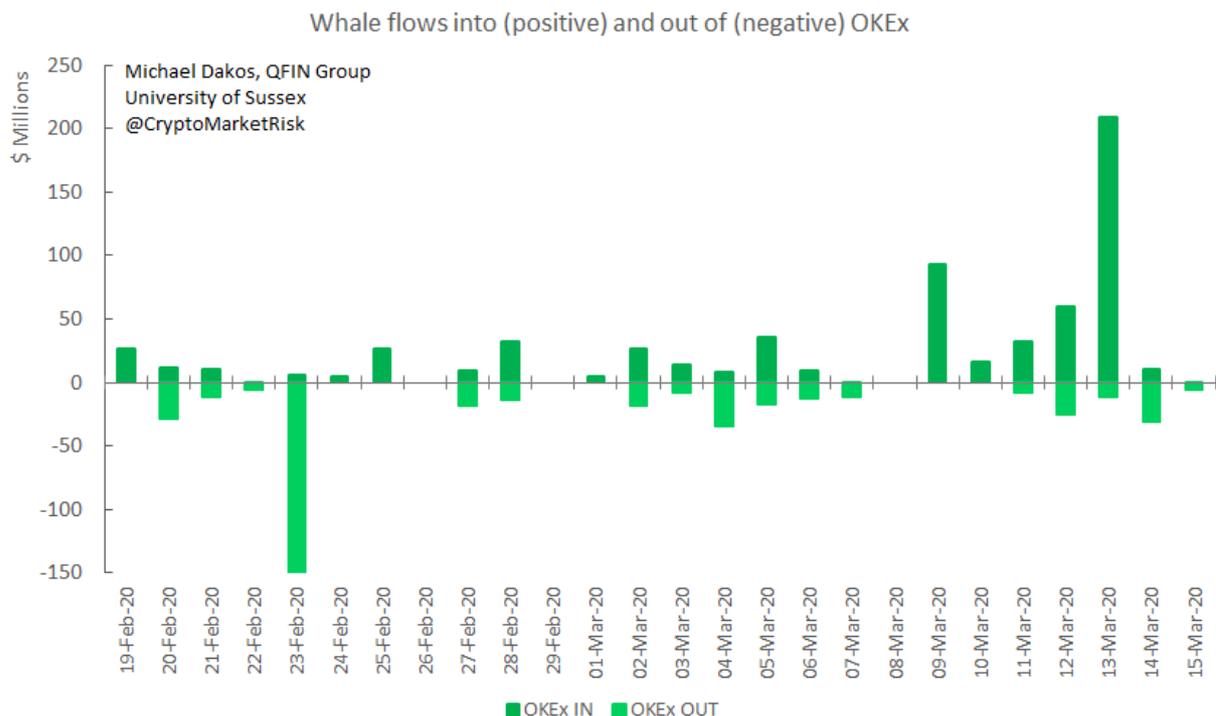


Date	From	To	Amount (crypto)	Crypto	Amount (USD)
2020-03-13 12:03:10	Tether Treasury	unknown wallet	10,000,000	USDT	10,072,145
2020-03-13 15:27:39	Tether Treasury	unknown wallet	11,000,000	USDT	11,243,353
2020-03-13 15:33:56	Tether Treasury	unknown wallet	6,000,000	USDT	6,049,304
2020-03-13 15:35:44	Tether Treasury	unknown wallet	10,978,022	USDT	10,967,536
2020-03-13 16:16:23	Bitfinex	Tether Treasury	20,000,000	USDT	20,221,710
2020-03-13 16:19:39	Tether Treasury	unknown wallet	9,450,000	USDT	9,478,369
2020-03-13 16:21:36	Tether Treasury	unknown wallet	8,000,000	USDT	8,024,861
2020-03-13 17:13:09	unknown wallet	Tether Treasury	8,766,000	USDT	8,769,611
2020-03-13 17:44:01	Huobi	Bitfinex	39,969,883	USDT	40,117,301
2020-03-13 17:58:28	Bitfinex	Tether Treasury	25,000,000	USDT	24,952,870
2020-03-13 18:00:39	Tether Treasury	Bitfinex	55,000,000	USDT	54,896,314
2020-03-13 18:01:55	Bitfinex	Tether Treasury	30,000,000	USDT	30,004,921
2020-03-13 18:14:24	Bitfinex	unknown wallet	49,969,882	USDT	49,920,184
2020-03-13 18:15:48	unknown wallet	Huobi	49,969,882	USDT	49,920,184
2020-03-13 18:30:27	unknown wallet	Tether Treasury	11,800,000	USDT	11,733,299
2020-03-13 18:46:39	unknown wallet	Huobi	6,412,501	USDT	6,435,261
2020-03-13 18:46:39	unknown wallet	Huobi	5,018,911	USDT	5,036,724
2020-03-13 18:46:39	unknown wallet	Huobi	5,144,339	USDT	5,162,599
2020-03-13 18:46:39	unknown wallet	Huobi	5,210,028	USDT	5,228,520
2020-03-13 18:46:39	unknown wallet	Huobi	9,416,959	USDT	9,450,383
2020-03-13 18:46:39	unknown wallet	Huobi	8,931,301	USDT	8,963,001

Michael Dakos, QFIN Group, University of Sussex, @CryptoMarketRisk

Almost \$40 million worth of USDT were transferred from Huobi to Bitfinex at 17:44 UTC on 13 March. And half an hour later almost \$50 million worth USDT were transferred from Bitfinex back to Huobi (with an unknown wallet as intermediary). And a little later at 18:46 UTC another \$40 million worth of USDT are transferred into Huobi. But we do not observe significant trading volume or price action on the Bitfinex XBT/USDT or USDT/USD pairs during or after that time. Speaking of tether, it is worth noting that its total supply increased by almost 1 billion tokens in the last two months: from 4.58 billion on 1 February 2020 to 5.34 billion on 18 March 2020. [8]

Finally, there were large flows into OKEx during the past month and again especially on 13 March.



All the on-chain flows into OKEx on 13 March were XBT transactions totaling almost \$210 million and were spread throughout the day. It is highly probable that transactions of almost identical amounts with the same timestamps (because they are included on the same block) are from the same entity, possibly denoting a larger whale. Note that the XBT-settled OKEx futures contracts allow up to 100x leverage, so these transactions could support positions on the OKEx XBT futures that are up to 100 times larger than the amount transacted on-chain. [9]

Bitcoin’s downward price spiral on 13 March 2020 started from BitMEX a little after 02:00 UTC and was then propagated to the other exchanges throughout the day, causing interesting bitcoin and tether on-chain flows. The large bitcoin deposits to BitMEX preceding the 02:16 UTC DDoS attack indicate that the attack was part of a very successful price manipulation strategy. These whale transactions quite possibly originated from some kind of bitcoin tumbler to obfuscate the actual origin of the funds, but they provide the trail we need to follow. Happy hunting! [10]

Date	From	To	Amount (crypto)	Crypto	Amount (USD)
2020-03-13 07:02:44	unknown wallet	OKEx	1,750	XBT	9,323,597
2020-03-13 07:02:44	unknown wallet	OKEx	2,000	XBT	10,655,522
2020-03-13 07:02:44	unknown wallet	OKEx	1,000	XBT	5,327,770
2020-03-13 08:12:01	unknown wallet	OKEx	1,000	XBT	5,592,691
2020-03-13 10:21:27	unknown wallet	OKEx	2,000	XBT	11,340,883
2020-03-13 10:21:27	unknown wallet	OKEx	3,000	XBT	17,011,326
2020-03-13 10:57:11	unknown wallet	OKEx	2,550	XBT	14,404,791
2020-03-13 12:40:27	unknown wallet	OKEx	5,000	XBT	28,444,462
2020-03-13 14:26:15	unknown wallet	OKEx	2,000	XBT	11,641,583
2020-03-13 14:26:15	unknown wallet	OKEx	2,000	XBT	11,663,226
2020-03-13 16:19:43	unknown wallet	OKEx	1,000	XBT	5,321,772
2020-03-13 16:19:43	unknown wallet	OKEx	1,000	XBT	5,321,772
2020-03-13 19:50:52	unknown wallet	OKEx	1,000	XBT	5,394,634
2020-03-13 19:50:52	unknown wallet	OKEx	1,128	XBT	6,085,147
2020-03-13 20:40:42	unknown wallet	OKEx	1,000	XBT	5,460,522
2020-03-13 22:56:09	unknown wallet	OKEx	5,000	XBT	28,187,777
2020-03-13 22:56:09	unknown wallet	OKEx	5,000	XBT	28,187,757

Michael Dakos, QFIN Group, University of Sussex, @CryptoMarketRisk

Michael Dakos

Notes:

[1] See [Bitinfocharts](#).

[2] See [Whale Alerts website](#), a [recent article](#) by SFOX for more details on Whale Alert and a [Bloomberg article](#) on bitcoin whale activity.

[3] See Whale Alerts [detailed explanation](#) on defining whale trades.

[4] See [Cointelegraph](#) article.

[5] See [BitMEX's contract specifications](#) and [article on 700x synthetic leverage](#).

[6] See Huobi Derivatives Markets [terms & conditions](#).

[7] See e.g. Cryptocompare data on the [XBT/USDT Huobi pair](#).

[8] See tether's [balance sheet](#) on the corresponding dates. See also [here](#) and [here](#) for our earlier articles on tether.

[9] See [OKEx's contract specifications](#).

[10] See [here](#) and [here](#) for the details of the two whale transactions right before the BitMEX DDoS attack, and [here](#) for another whale deposit to BitMEX a couple of hours later.

BitMEX's Hidden Channels

Currency traders have recently been fined billions of US dollars for collusion using on-line chat rooms to share sensitive information and manipulate trades. Could BitMEX research's channels on the lightning network be providing a more private venue to chat? And why does a 'research' network have channels with over 250,000 dollars on account?



Figure 1: BitMEX Research Lightning Network @ 18:00 UTC on 15 March 2020

There are 600+ BitMEX Research channels on the Bitcoin lightning network shown in Figure 1.[1] Full details of the node activities are given here.[2] What can the extent of this global 'research' communication be... they are blogging, but are BitMEX planning to publish a book?[3]

Officially, US investors are banned from BitMEX due to the lack of KYC/AML regulations. In practice however, this ban can be circumvented using a simple VPN. [4] Or, indeed, any investor from anywhere, with only a lightning node, can transfer bitcoin via BitMEX research's channels.

The channel set-up is recorded on the Bitcoin blockchain, but after set-up and until the channel is closed funds can be transferred under the radar. For example, Figure 2 (below) shows a channel set up by OpenNode.com on 17 March 2020, with 52.42799477 bitcoin still on one side (Columbus, OH, United States) and 6.81572567 already transferred to BitMEX research.

There is no indication of what this research by BitMEX is, why it is being paid for, and indeed why some node in Ohio just put in over a quarter of a million dollars worth of bitcoin for this research.

Most channels are used for micropayments as intended when the Lightning Network was set up. But some channels are set up with a very small amount of bitcoin to be used only for communication via highly encrypted messaging, as explained in this excellent Bitcoin Magazine article.[5]

Currency traders have been fined huge amounts for cartel behaviour co-ordinated via on-line chat rooms. For instance, in May 2019 Citigroup, JP Morgan Chase, Barclays, Royal Bank of Scotland and MUFG Bank in Japan were fined \$1.2 billion for using chat rooms to rig forex spot trading. [6] And in October 2018 the notorious "Cartel" in the UK cost global banks \$14 billion in penalties. [7]

Could it be that they have simply moved to a more private venue

Node Channels: BitMEXResearch Follow

Overview **Channels** Statistics History Neighborhood Monitor

Public Node

Capacity
6.81572567 BTC (0.754%)
681,572,567 sat
\$35,423.98

Channel Count
618 (1.726%)

Connected Node Count
588 (9.035%)

Color
#8392ff

IP Addresses
167.172.44.148:9735

Owner Info

https://research.bitmex.com
@BitMEXResearch
LND
Broomfield, CO, US

JSON Tweet API

Last Update
17 hours ago

First Seen
a year ago

Age
a year

Channels - Newest 618 results

Newest Last Updated Top Capacity Lowest Base Fee Lowest Fee Rate
Name Closed Channels

Connecting 588 nodes (9.035% of active nodes) via 618 direct channels

Channel Id: 683614757582274561 Active

Short Channel Id 621744x1256x1
Channel Point c401f119009ce251fcb7c810ea6c2b8058ab8d486288767975971865027d67ec:1 [block explorer]

Capacity 0.08000000 BTC 8,000,000 sat (0.008853%) \$415.79

Last Update 15 hours ago **First Seen** Monday, March 16, 2020 **Age** 2 days

Node 1 [this node]: 0395033b252c6f40e3756984162d68174e2bd8060a129c0d3462a9370471c6d28f

Alias	Capacity	Time Lock Delta	Min HTLC	Base Fee	Fee Rate
BitMEXResearch (Broomfield, CO, United States)	6.81572567 BTC \$35,423.98 681,572,567 sat	40	1,000	0.001 sat \$0.000000052	0.000005 sat \$0.00000000280

Node 2: 03abf6f44c355dec0d5aa155bdbdd9e0c8fefe318eff402de65c5eb2e1be55dc3e

Alias	Capacity	Time Lock Delta	Min HTLC	Base Fee	Fee Rate
OpenNode.com (Columbus, OH, United States)	52.42799477 BTC \$272,488.74 5,242,799,477 sat	30	1	1,000 sat \$0.000061974	0.001000 sat \$0.000000051974

Channel Id: 682737347374874625 Active

Short Channel Id 620946x2348x1
Channel Point ea5ac498483775aef5c50ae4f917e03d0ec4985c0148ba94ddc77633afb9f0e:1 [block explorer]

Capacity 0.02000000 BTC 2,000,000 sat (0.002213%) \$103.95

Last Update 3 hours ago **First Seen** Monday, March 16, 2020 **Age** 2 days

Figure 2: A Snapshot of BitMEX's Research Node's Newest Channel (18 March 2020)

Carol Alexander & Michael Dakos

Notes:

[1] There are other BitMEX nodes on the lightning network, such as this <https://1ml.com/node/0274ce2cee1266882c266940abd10d1a8c5285c68fd984e468e325884b9b5e526c/channels> but the BitMEX research node is by far the most active.

[2] <https://1ml.com/node/0395033b252c6f40e3756984162d68174e2bd8060a129c0d3462a9370471c6d28f>

[3] <https://blog.bitmex.com/lightning-network-part-6-over-60000-non-cooperative-channel-closures/>

[4] <https://www.bestbitcoinbroker.net/en/bitmex-exchange-for-us-traders/>

[5] <https://bitcoinmagazine.com/articles/how-the-lighting-network-could-improve-encrypted-messaging>

[6] <https://www.ft.com/content/73163fa0-77c5-11e9-bbad-7c18c0ea0201>

[7] <https://www.bloomberg.com/news/articles/2018-10-09/currency-cartel-traders-on-trial-for-chats-that-cost-billions>

BitMex Regains Price Leadership Before DDoS Attack

On BitMEX, in the early hours of Friday 13 March, a whale moved on board with \$200 million worth of BTC and a few minutes later a DDoS attack drove the price of bitcoin down to 3,600 USD.[1] But unusual events were unfolding already, the day before...

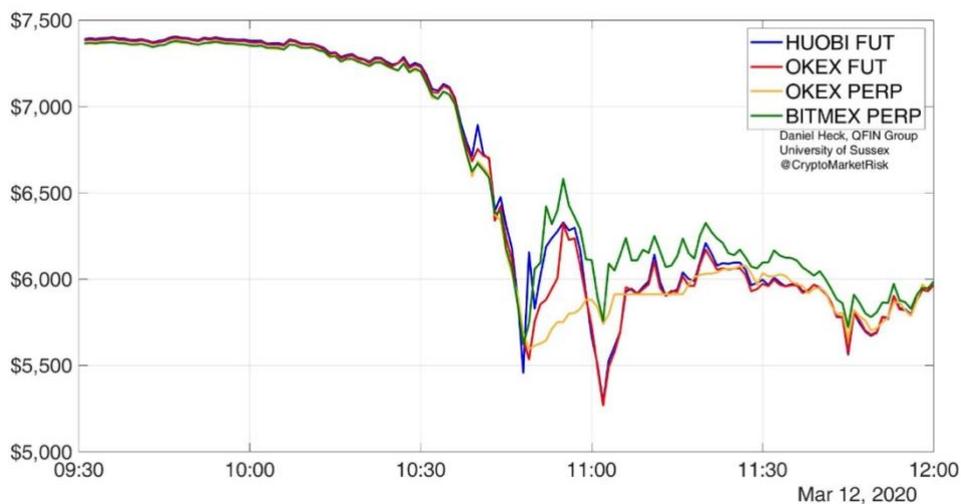


Figure 1: Minute-Level Prices of Major Bitcoin USD Derivatives 09:30 to 12:00 UTC, 12 March 2020

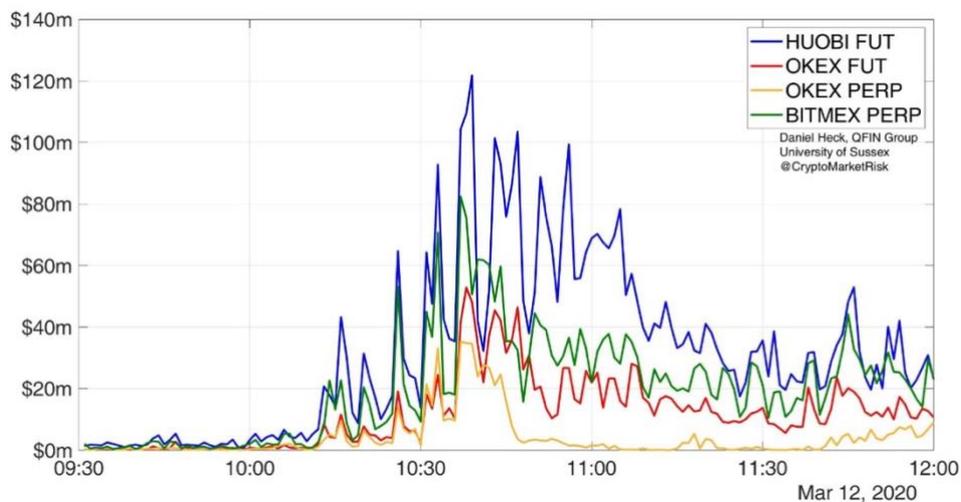


Figure 2: Minute-Level Prices of Major Bitcoin USD Derivatives 09:30 to 12:00 UTC, 12 March 2020

Since the study of Alexander et al.[2] the price leadership of the exchange's perpetual swap has been diminishing, in favour of OKEx and Huobi.[3] Here we use the same econometric models with ultra-high-frequency price and volume transaction data to show that BitMEX regained its dominance during the crash on March 12, the day before the DDoS attack.

Figure 1 depicts the price of the four most heavily traded bitcoin USD derivatives – the quarterly futures on Huobi and OKEx, and the perpetual swaps on OKEx and BitMEX. Between 10:30 and 11:00 on 12 March the dollar price dropped from around \$7,250 to \$5,500, briefly falling even further before recovering. Overall, this sharp price decline reduced bitcoin's market cap by more than \$20 billion in just 2.5 hours and led to record highs in the bitcoin volatility index.[4]

During the same interval we witnessed record-breaking trading volumes: a total of more than \$10 billion on all four products over the period.[5] See Figure 2. Huobi futures were the most-traded product, reaching a peak of \$120 million in just one minute, at 10:38. But the BitMEX perpetual traded \$80 million notional during the preceding minute. One can see from the figure how the volumes really start to rack up on these two products as selling pressure mounted – starting at about 10:15, well before the price actually fell.

A four-dimensional price discovery analysis of the instruments' influence, based on minute-level transaction data for the period from 09:30 to 12:00, using a vector error correction model (VECM) with price discovery metrics.[6] This shows that the BitMEX perpetual was responsible for 64% of the total price leadership, followed by Huobi and OKEx futures, each with around 15%. The OKEx perpetual was almost entirely a price follower.

Next, we limit our analysis to the interval from 10:00 to 11:10 – the period of the main price drop – and at the same time, we increase our frequency to second prices. However, we have to exclude the OKEx perpetual due to low trading volume. This UHF analysis confirms the leading role of the BitMEX perpetual (49%) over Huobi (27%) and OKEx (24%) futures.

High-frequency traders are interested in the speed of information transmission between the two leading instruments during the price drop. Given the unusually strong price leadership role of the BitMEX perpetual on March 12, jumps up unexpectedly by 1%, how long would traders on Huobi have to follow this move and still make a profit?

To answer this question we use impulse-response analysis in a 2-dimensional VECM assuming a price jump of 1% on the BitMEX perpetual. The output is the expected percentage spread between the BitMEX perpetual and the Huobi futures, immediately after the shock and during the following minutes. The spread is shown in Figure 3 below.

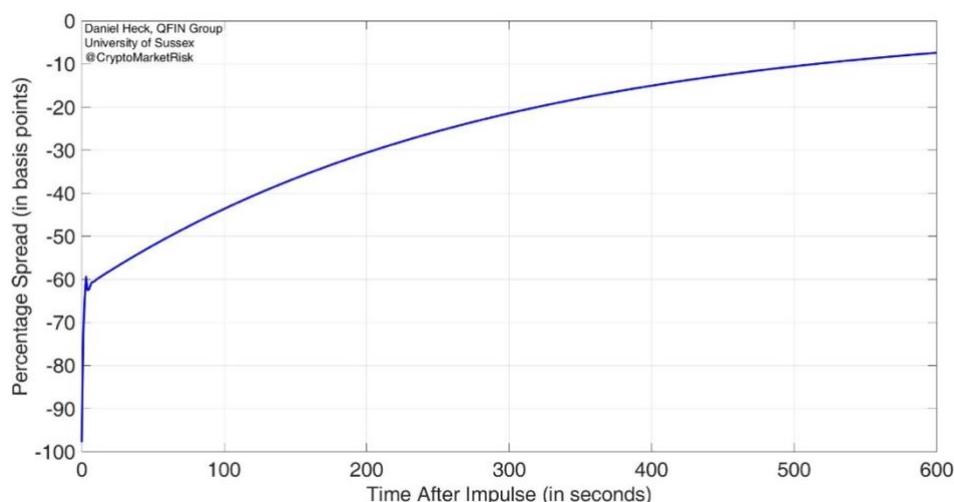


Figure 3: Expected Percentage Spread between BitMEX perpetual and Huobi futures following a price jump of 1% on BitMEX

Within the first 5 seconds after the shock, the Huobi futures make a large adjustment of 40bps. Subsequently, the spread continuously narrows and converges to -7bps after 10 minutes.[7]

Clearly, during the huge price drop in the morning of 12 March the BitMEX perpetual took control of the driving seat. But what was the reason? Was it just caused by panic about the COVID-19 virus (and, more importantly, the response to this shock in the US markets) or was it manipulation? Could be it associated with the DDoS attack on BitMEX on 13 March?

An examination of the BitMEX perpetual order book allows us to dig deeper into traders' operations during the morning of March 12. Given that we want to examine selling pressure, we focus on the ask side here, although the order book skew indices that we have developed are applicable to either side. These are called λ .OBSA for the ask side, and λ .OBSB for the bid side.

Each index is calculated every minute as an exponentially weighted median – mean difference where the mean (c) and median (d) are calculated as follows:

- (a) Record the 20 best ask price levels, including the corresponding volume on each level;
- (b) Weight the volume on each of the 20 levels exponentially, depending on their distance from the best ask price;[8]
- (c) Calculate the average of these 20 (weighted) volume figures; and
- (d) Calculate their median also.

The rationale behind these calculations is that the difference between the mean and median captures the skew in this side of the order book. Normally, the ask side of the order book has positive skew (median < mean) but if the skew increases disproportionately (median << mean) some unusually large orders can be appearing just above the ask price.

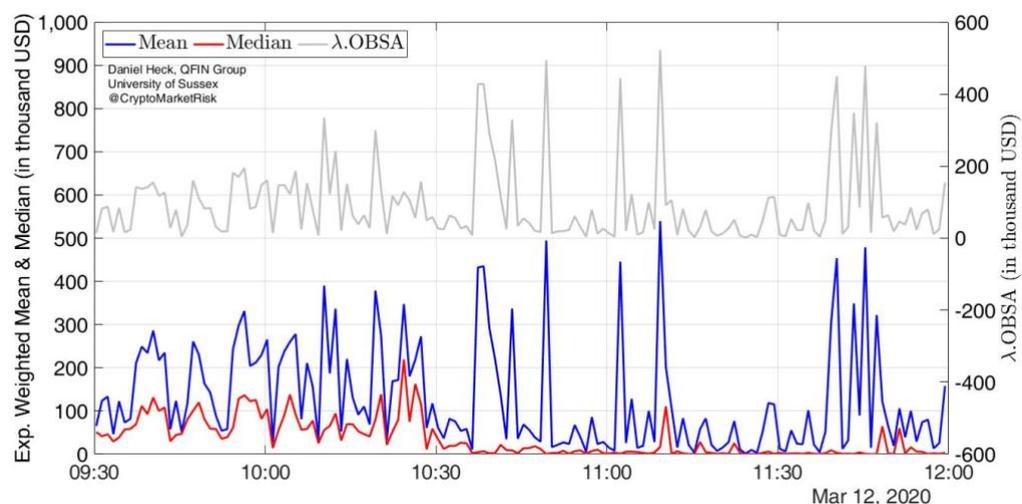


Figure 4: Exponentially Distance Weighted Mean and Median Volume on 20 Best Ask Price Levels

The mean and median results as well as their difference – i.e. the OBSA index (with $\lambda = 0.95$) are shown in Figure 4. Until 10:30, mean and median ask volume were quite large and close together. This indicates continuous selling pressure on the book, but no unusually large sell orders. However, for

several minutes around 10:38 and 11:40 the mean and median differ widely. That is, there were some extremely large sell orders inside the book, and it is these that finally brought down the price.

To see whether these unusually large order sizes were aimed at manipulating the BitMEX perpetual price, we extract (for closer examination) all minutes with a sell-order volume greater than \$5 million on any of the 20 best ask price levels. That is, we look for a very large sell order inside the book but not too far from the best ask price.[9] For each of these very large orders Figure 5 depicts the percentage difference (in basis points) between the order's ask price and the mid price at the time. We also include the respective time.

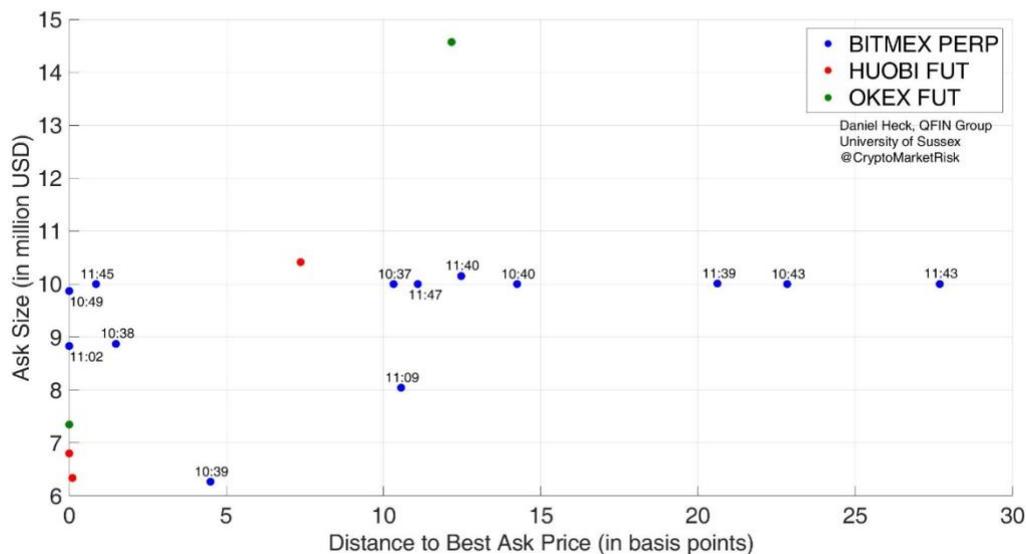


Figure 5: Large Orders and Their Distance from the Best Ask Price

The five very large volumes at (or very near) the best ask price were probably placed by traders (two on BitMEX, two on Huobi and one on OKEx) who wanted to close their long positions as fast as possible after the price plummeted between 10:30 and 10:48. However, after this time we also see several very large offers on BitMEX, all quite deep in the book and most with a size exactly equal or very close to the maximum order quantity of \$10 million.

This type of racking up of artificial liquidity is par for the course, in all the less-regulated bitcoin markets. But it doesn't often happen on such a large scale as it did on the BitMEX perpetual on 12 March 2020.

Carol Alexander & Daniel Heck

Notes:

[1] See [What are bitcoin whales and why should we care?](#)

[2] Alexander C., Choi, J., Park, H., and S. Sohn (2020) 'BitMEX Bitcoin Derivatives: Price Discovery, Informational Efficiency and Hedging Effectiveness.' Journal of Futures Markets. 40 (1). pp. 23-43. ISSN 0270-7314 .

[3] <https://www.linkedin.com/feed/update/urn:li:activity:6643866814826721280/>

[4] See [Bitcoin VIX](#)

[5] For comparison, Coinbase – the most liquid spot exchange – had a maximum trading volume of only \$5 million during this interval.

[6] The full econometric methodology is described in Alexander et. al. (2020), and references therein.

[7] Seven basis points is a typical spread between these products, because of the basis. It will be positive or negative depending on the contango or backwardation in the futures term structure, which changes over time.

[8] That is, we choose some parameter λ between 0 and 1 and multiply the volume on the second best ask price by λ , the volume on the third best ask price by λ^2 , and so forth. The exponential-weighting parameter λ is used to turn up or down the effect on the index of large volumes that are deep in the order book – they have less effect on the index as λ decreases.

[9] If some trader wanted to manipulate the price by placing a very large sell order without the intention to execute – a method of manipulation called spoofing – he wouldn't place it aggressively near to the current best ask price, but rather a few dollars above.