

A Few Insights into Crypto Risk

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Cryptocurrency investing has really come a long way since its beginnings. While crypto concepts came to the fore in the 1980s and 1990s, it wasn't until an unidentified individual (or possible group) known by the pseudonym Satoshi Nakamoto published a whitepaper in 2008 summarizing Bitcoin, that the crypto market was born.

Then in 2015, we saw the rise of today's second-highest valued crypto—Ethereum. Up until around five years ago, the two cryptocurrencies were not really considered a serious means of transaction due to their limitations and lack of regulation. Portfolio exposures among crypto investors at the time was limited to 0.5% to 2%. In the ensuing years, however, a significant number of different vehicles became available to gain further exposure to digital assets, and as crypto prices started to skyrocket, portfolio exposures expanded to 5% to 10%.

In 2021, the value of the crypto market exceeded \$2 trillion. By this time, the term “cryptocurrency” was well-known throughout households and financial institutions. Despite crypto's known wide volatility swings, it no longer became risky for institutions to own crypto from a reputational point of view. Also, where there is opportunity for alpha—and there have been crazy amounts of alpha in this space—there will be investors.

What brings me to write this short whitepaper is that during the past several months, there has been a widespread crash in cryptocurrency prices. For example, Bitcoin had fallen to under \$21,500 on July 7, 2022 from a high of nearly \$68,000 on November 8, 2021, losing approximately 68.5% of its value. This reminded me of a crypto event, held in early May 2022 with an institutional focus and sponsored by Risk.net, where I participated in a panel discussion regarding market risks and the challenges of modelling risk in a portfolio with digital assets. There are two key points about risk that were

raised that I think are important for both current institutional participants or those just beginning their crypto journey to be aware of and understand.

1. Lesser Known Risks

In the crypto market, there are lesser-known risks that may not be taken into consideration by institutional investors, such as the risks associated with crypto derivatives and how to respond to the high volatility. What we're starting to see is a manifestation of wrong way risk, which the market hasn't really dealt with yet, though there have been some recent events that have forced firms to start thinking about this risk.



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– Satyam Kancharla (fourth from left)

As an example of wrong way risk in the crypto market, some DeFi (decentralized finance) venues allow cryptocurrency to be used as the collateral on loans, and then borrowers use their loans to buy more cryptocurrencies. This creates wrong way risk for the lender due to the correlation between the exposure (the loan) and the collateral that is expected to protect against that exposure. If the market collapses, the borrower is at a heightened risk of default, plus the value of the collateral has decreased, substantially increasing the lender's risk.

Another wrong way risk example we're seeing is when a speculator bets on the continued appreciation of cryptocurrencies by buying crypto derivatives (long delta)

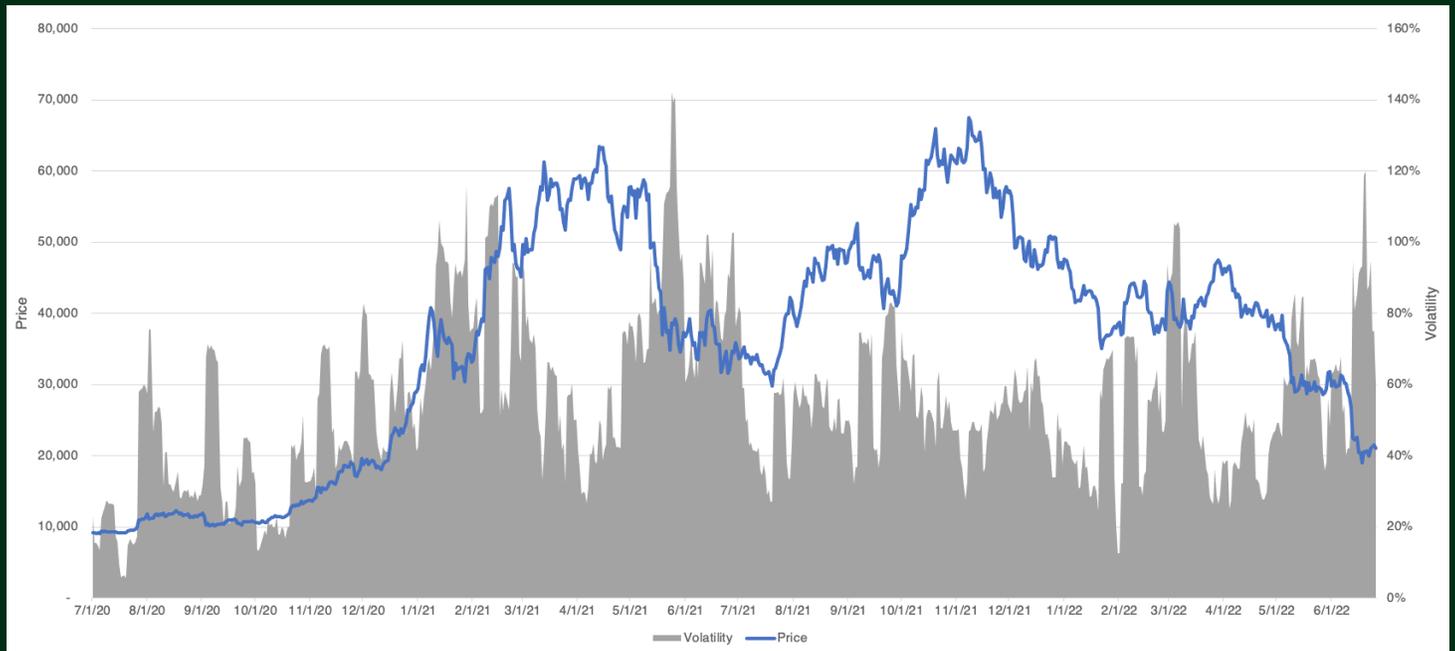
from a liquidity provider. If there is a severe downward shock to crypto prices, the derivatives will cause significant losses for the speculator, exacerbating the liquidity provider's credit exposure to the speculator at the exact time the speculator will be more likely to default.

So wrong way risk can come about due to high correlations between crypto prices and collateral values, or between crypto prices and credit risk. We think firms need to stay on top of this risk by requesting more collateral and/or by requiring non-crypto collateral from counterparties, and by monitoring counterparty credit risk more tightly, ideally in real-time.

A Look at Bitcoin's Volatility Dynamics

Bitcoin's volatility dynamics seem to be somewhat unique compared to other asset classes. Bitcoin volatility tends to spike during both upward price movements as well as downward moves, whereas equity market volatility tends to decrease as markets rise, and it increases as markets decline. Perhaps more Bitcoin option trading volume will be hedging focused in the future, as the chart below indicates that the highest volatility spikes occurred during dramatic price drops.

BTC-USD PRICE & VOLATILITY



Source: [Yahoo Finance](#), data from July 1, 2020 to June 26, 2022
Volatility is historical 7-day rolling volatility, annualized

2. Modelling Risk in a Portfolio with Crypto Derivatives

A question Numerix receives from a lot of clients is how do they manage digital asset class exposure within a broader universe of asset classes. This is where modelling very much matters and a very interesting aspect about all crypto assets is that in some sense they are a currency and in another sense a commodity but also it can be said they are neither. It is a truly unique asset class and what we are doing at Numerix is building models that conform to the particular characteristics of this type of asset by, for example, looking into its past history. But there is not much history, so we are going with limited data and data acquisition is a key challenge for modelling risk. What we do, then, in terms of modelling, is we bring in capabilities that we have seen in other asset classes that behave similarly as digital assets, such as FX and commodities, and we try to calibrate them and bring some of their characteristics, along with data on market liquidity, to modelling crypto derivatives.

Much of the modelling effort is looking into the realized volatility and assessing what type of applied models would suit best. In this regard, we have to take into account that crypto behaves as a commodity in terms of the size and type of volatility that we see. We also have to manage the underlying collateral, manage the underlying margin processes, and handle the interest rate elements as well, so it has to be a multi asset approach. Beyond that, a lot of it is the art of configuring and calibrating the models and consuming the data that we have.

However, I believe that if and when the crypto derivatives market becomes a mature market, this should ease some of the modelling and risk management challenges. ■

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Mr. Kancharla, as Executive Vice President, Chief Product Officer, is responsible for corporate strategy and currently heads the Client Solutions Group at Numerix. This group is responsible for Product Management, Financial Engineering and Business Analysis. Prior to this, he has served in various roles in Quantitative Software Development, Financial Engineering and Client Services at Numerix. Before transferring to Numerix in New York City, he was the CTO for Numerix Japan LLC in Tokyo, heading the Pre-Sales and Financial Engineering teams for Asia.

Prior to joining Numerix in 2003, Mr. Kancharla also worked with Merrill Lynch and GE Capital in Quantitative Finance and Product Development roles.

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