Almost every market crash or credit crisis stems from an operational risk. Last year, there were two major events in crypto markets: the Terra/Luna attacks in May and the FTX collapse in November. Both caused a dive in crypto asset prices. Bitcoin started the year near its all-time high of US$68,000 and ended it not far above its all-time low of £15,500. After the FTX collapse, the bitcoin implied volatility index (BVIN) stayed at around 100% for a month (see Figure 1). Correlations between bitcoin and other crypto assets are very high and the entire ecosystem has been seriously affected.

The operational mismanagement of both Terra and FTX caused immediate contagion, mainly to bankruptcies of lending protocols including Anchor, Babel Finance, BlockFi, Celsius, Salt, Vauld, and Voyager Digital. But it also affected the solvency of major companies across the entire crypto asset ecosystem: after FTX, several other centralized (order book) exchanges went bankrupt, such as CoinFlex, Zipmex, and Genesis; custodian banks like Nuri went under, as did major hedge funds like Three Arrows Capital; and mining companies like Core Scientific and even staking platforms like Freeway have all bitten the dust in 2022.

This so-called “crypto winter” is far from over. As I predicted at the start of the year, the price of bitcoin has been stable trending during the last few months. But the catalyst for this imminent bull market is the need to draw in more retail investors, which is yet another risk-in-waiting, as is the fact that the number of fungible crypto assets grew from around 16,000 in January 2022 to about 22,000 by the end of the year. In fact, the experiences of 2022 have uncovered many operational risks that are yet to play out.

**Losing Lenders**

Looking back to 2022, the Anchor protocol on the Terra blockchain used to offer up to 20% API on deposits of UST (the US dollar form of the terra stablecoin family) until its collapse in May 2022. This unbelievably high return is exactly what drove up the market cap of UST from less than US$3 billion in November 2021 to over US$18 billion six months later. Just like a Ponzi scheme, to pay such a high interest on existing deposits required continual growth in new deposits. Either that, or Anchor was making loans with enormously high risks. Not surprising then that, more than any other sector, it was

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**Figure 1: The Bitcoin Implied Volatility Index Streamed by CryptoCompare.**

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<th>BVIN Index 1 Year Chart</th>
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The Bitcoin Volatility Index (BVIN) is an implied volatility index that also represents the fair value of a bitcoin variance swap. The index is calculated by CryptoCompare using options data from Derivix and has been developed in collaboration with Carol Alexander and Arifinn Imreraj at the University of Sussex Business School. It follows the research design of Alexander and Imreraj (2020) and as such it is the first rigorously constructed index that is suitable for use as a settlement price for bitcoin volatility futures.

You can find more information on the Bitcoin Volatility Index (BVIN) methodology page.

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As I predicted at the start of the year, the price of bitcoin has been stable trending during the last few months.
the decentralized finance protocols like Anchor that suffered most from the crypto operational risks of 2022.

Nevertheless, numerous lending platforms remain, and one of the disasters to watch out for in 2023 is the default of decentralized “shadow banks”. According to DeFi Llama, at the time of writing, the largest of these open source, non-custodial protocols to earn interest on deposits and borrow assets is Aave, which has US$3.78 billion total value locked (TVL) mostly on the Ethereum chain. Also, JustLend is a Tron-based lending protocol with US$2.57 billion TVL and there are numerous other, smaller lending platforms such as Venus, Abracadabra, and Iron Bank.

Figure 2 depicts the RiskDAO dashboard of the bad debt that started to pile up in this sector at the end of 2022. At the time of writing, Inverse Finance has the highest debt-to-TVL ratio of 81.89%, and with almost all accounts insolvent it will probably go under before this article reaches print. More concerning, because much larger, are Venus and Iron Bank which currently have debt-to-TVL ratios of 8.18% and 12.24%, respectively.4

**Magic Money?**

Three Arrows Capital (3AC) were involved in a form of so-called “yield farming” (crypto term for magic money tree) which eventually brought down this hedge fund in June 2022, shortly after the collapse of major lending protocol Celsius and shortly before Voyager also went bankrupt. By depositing native tokens on a staking service such as Lido, a player earns a share of the rewards from Proof-of-Stake blockchain building. Figure 3 depicts the yields available on five different chains, at the time of writing. For instance, staking on Polkadot offers 17.3% API, which is almost as much as offered on deposits by the Anchor protocol in 2022.

But that is not all. In return for depositing DOT (the native token for Polkadot) the player receives another token called staked DOT, or stDOT for short, “which can be put to work”. How?

Staked tokens can be used as collateral on lending platforms like Aave. For instance, one stETH can be used as collateral to borrow one ETH at a basic interest rate of 0.5% plus a premium which decreases to zero as the sum borrowed increases.7

Most proof-of-stake chains have a staked equivalent to their native token, and the price of a staked token should be pegged 1:1 with the native token. However, these tokens are traded in the liquidity pools of decentralized exchanges, especially those of Curve which specializes in staking and stablecoins. The manipulation of prices on Curve, through sudden withdrawing of liquidity, is another operational risk to watch for in 2023. For instance, it was the rapid withdrawing of UST liquidity which made its price rise way above US$1, causing its sister token Luna to crash and thereby destroying the algorithm which underpinned this new type of stablecoin.9

This use of staked tokens as collateral is the root of a magic
money tree (see Figure 4). According to Nansen research, 3AC used this process to make very high returns until the depeg of stETH (again via Curve liquidity pulls) precipitated the collapse of Celsius and other players of the same game.

How does this money tree work? It relies on the 1:1 peg of a staked token to the native token. For example:

1. For every 100 ETH, say, placed with a DeFi staking service like Lido, a player like 3AC would receive less than 100 stETH — let us say 50 stETH;
2. It can use the 50 stETH as collateral for a loan of 50 ETH from Celsius, or another lending platform charging minimal interest;
3. Then this borrowed 50 ETH could be staked, so now the player is earning staking rewards on another 50 ETH, plus they will receive another 25 stETH;
4. Go to step 2.

In fact, 3AC were staking on Ethereum in the early days before the merge to proof-of-stake on the main net. Rewards were higher then, and because their stakes were so large, 3AC could have staked directly, and not even had to pay fees to a staking service. This just means that the staking rewards were likely to have been much higher than currently shown on Lido (see Figure 3).

Even if not so profitable for small investors, this type of magic money tree will continue as long as liquid staking returns more than liquidity protocols charge in interest. Staking services appear solid for now. For instance, Figure 5 shows how steady the growth of TVL in Lido has been since the collapse of Celsius and Voyager. But some lending protocols are in trouble with bad debt. Even Aave, the largest, has seen an 80% decline in TVL since its all-time-high of US$19 billion.

At the time of writing, I am receiving “Get back on track with a $20 cash back” and similar emails from Binance several times a week. This is because the Binance business model still relies on fee income from the retail sector. By contrast, Jane Street, Jump, Cumberland Capital, and other professional traders on Binance and other “self-regulated” crypto exchanges pay no fees on derivatives trades; in fact, there are even negative fees for futures market makers.11 Professional traders do not want to trade against each other (which is why such trades are called "toxic flow"). These traders may also run ultra-high frequency algos that can perform trades (like “layering” and “spoofing”) that are illegal on ordinary exchanges, and which can drive the price up, down, or sideways as they wish.

My column in the last issue of Wilmott explained how both the price and volatility of bitcoin is driven by Binance’s bitcoin-tether perpetual. Having held the price remarkably steady in December 2023, I believe the professional traders’ algos will be configured to manage a bitcoin bull
run in 2023. Why? Well, how else will they draw
retail traders like you and me (who are now very
scared) back to trading crypto?

Both market makers and exchanges need retail
investors to come back. Exchanges need their fee
income (market makers pay no fees), and for market
makers it is because when their algos are equally
good (i.e., not Alameda’s) they have only a 50:50
chance of winning a trade against another market
maker. But retail investors who take risky, leveraged
positions are very likely to be wiped out, being auto-
matically liquidated (without any margin call) by an
electronic platform which acts as its own clearing
house (as well as broker and custodian).

So, I don’t think bitcoin will crash in 2023. The
professional foot will remain gently but firmly
(but on the bitcoin price accelerator pedal, and Binance
will be pleased. Because crypto rising is just about
the only thing that might draw scared retail inves-
tors back into the toxic carousel.12

**Stress Scenarios**

To conclude, even though we may well see a bitcoin
bull run in 2023, this is not a sign of operational
risks that have been mitigated or markets that are
maturing.13 It only shows that “self-regulated”
exchanges (and Binance especially) continue to
 dominate the future of the entire crypto asset eco-
system.

The dominance of Binance is the major opera-
tional risk of 2023. Its insolvency would decimate
centralized finance, including data providers,
research analysts, aggregators, oracles, as well as a
large fraction of the 22,000 blockchain-related com-
panies that have been crowdfunded through token
offerings since 2014.

Therefore, the “Proof-of-Reserves” question is
going to be very important in 2023. An exchange
like Binance — which operates as its own clearing
house, lending platform, stablecoin provider, and
fiat broker and custodian — cannot prove its sol-
vency by counting the bitcoins it has in custody.
This could give some idea of solvency for its custo-
dian activities, at most, but it says nothing at all
about its solvency as trading platform and clearing
house. Instead, crypto market regulators should

**Binance and other “self-regulated”
crypto exchanges, need to prove their
solvency in 2023 and not just their
ability to cover customer withdrawals**

require exchanges like Binance to perform proper
stress tests for capital adequacy.

This type of stress test requires the operations
that underpin the clearing and settlement activities
to be subjected to “what if” scenarios of the worst
possible type. Often, they are taken from historical
data. For instance, what would happen if the price
of all the derivatives products on Binance fell by
25% in one hour? If that happened today, plenty of
losing customers would have their accounts liqui-
dated entirely, other winning customers would be
“automatically deleveraged” so that their profits
suddenly reduce by a factor of 10 or more, and the
prices of derivatives might just continue to fall
more and more in the panic as the insurance fund
has to clear larger and larger losing positions on the
open market.

Or maybe not. We just don’t know unless such a
test is properly performed. The Bank of England has
developed complex stress tests for capital adequacy
of central counterparties.14 Similar tests should be
applied to Binance and other “self-regulated” crypto
exchanges, who need to prove their solvency in 2023
and not just their ability to cover customer with-
drawals.

**ENDNOTES**

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