



The new rules of market risk management

Amid 2020's Covid-19-related market turmoil – with volatility and value-at-risk measures soaring – some of the world's largest investment banks took advantage of the extraordinary conditions to notch up record trading revenues. In a recent *Risk.net* webinar, convened in collaboration with Numerix, an expert panel discussed the changing nature of market risk management and how innovative approaches to stress-testing, technology and analytics are helping firms navigate these challenging times

Market risk is a constantly evolving concept, but combining it with a novel global pandemic brings new complexities. It is not market risk alone that is changing, but also how it is stress-tested and how external market forces alter it.

Last year there was high volatility in markets, with record daily value-at-risk (VAR) for many banks, and the largest one-day drops in many asset prices since the depths of the global financial crisis that began in 2007–08, and worse in some cases. Correlation breaks, mass sell-offs and panic ripped through global markets until fiscal support and monetary stimulus measures kicked in.

As new approaches and ways of market risk have emerged, risk managers need to understand change faster.

Risk experts say the volatility and uncertainty of 2020 reminded them of the 2007–08 financial crisis, the market turmoil led by the events of September 11, 2001, when the stock market lost significant capital, as well as 1998's Russian debt crisis and the demise of hedge fund long-term capital management.

Gyrations this time around were similar or worse; however, financial markets proved to be more sophisticated and resilient. And, while companies were better prepared, they did not have the recipe to tackle the crisis.

"The volatility of the credit spread during March 2020 was particularly interesting. The speed [with] which it went up and down and the disconnect between how cash and synthetic instruments were moving was very rapid and sharp, both intraday and on an end-of-day basis," said Bevan Cowie, managing director and head of market, liquidity, valuation and model risk management at Deutsche Bank.

"It has forced us to think not about market risk in its own isolated space, but the contingent things that are out there, whether they are operational or stemming from other risk landscapes that have an implication on market risks," he added.

Rama Chirayathumadom, chief model risk officer at Goldman Sachs Bank USA, said that, overall, firms seem to have been better prepared during this crisis.

"This was thanks to the experience of dealing with the 2007–08 financial crisis, and having those basic tools of assessment of risk in terms of scenario analysis, stress-testing, dealing with stress data in your time series. It helped inform choices and how one should assess parameters on a periodic basis."

THE PANEL

Moderated by Tom Osborn, Editor, Risk Management, *Risk.net*

Dennis Sadak, Senior Vice-President, Risk Product Management, Numerix

Bevan Cowie, Managing Director and Head of Market, Liquidity, Valuation and Model Risk Management, Deutsche Bank

Rama Chirayathumadom, Chief Model Risk Officer, Goldman Sachs Bank USA

What was different this time around, Chirayathumadom pointed out, were certain situations such as negative oil prices on futures contracts, which had not been historically contemplated. "Those are areas where you would have to make changes on the go."

Compute capacity

Dennis Sadak, senior vice-president, risk product management at Numerix, noted the greater demand for computer power as the pandemic evolved.

"There was higher reliance on cloud-based services to expand the compute capacity to be able to recalibrate things such as stressed VAR (SVAR), which requires processing more than 10 years of historical data and analysing how this new crisis will impact it," he said. "That requires enormous compute capacity, and it requires a large amount of data processing in order to re-evaluate."

Another pressing factor was the operational complexity of ensuring staff could work remotely, said Sadak. "Again, things like managed services and cloud computing really helped in that area to alleviate some of those pressures."

For many firms, adjusting to the evolving market conditions included incorporating new stress-testing approaches, while others redefined their scenarios.

Stress-testing and SVAR

"We were running scenarios in December 2019 and January 2020 for Covid-19 and thinking about the implications. Admittedly, we would not have gotten those scenarios exactly right, but it enabled us to go in with eyes wide open on what our portfolio looks like," said Cowie.

Cowie also cited 2020's US elections as an example of different scenarios



Dennis Sadak, Numerix

being tested based on outcomes, and with varying severity, to understand portfolio behaviour and prepare for the future.

Sadak observed that customers were paying greater attention to risk measures and incorporating new stress tests. “The reliance on regular VAR, with a one-year lookback period – which is the standard way of calculating historical VAR – has taught us a lesson several times, because this measure is very procyclical. If you have a prolonged period of calm markets, this VAR stays small.

But, once you enter some kind of crisis, you slowly start incorporating this stress-period theory into this one-year historical VAR and, all of a sudden, the measure starts growing or even exploding if the drops are as extreme as we have seen during this crisis.”

This, Sadak added, has a significant impact on initial margin rates.

“We have seen a lot of our customers paying more attention to things such as SVAR, which has a much longer lookback horizon and, as a result, is a more stable measure and does not have as much of the procyclicality as the regular VAR.

“Customers started incorporating new stress tests and scenarios into their models to deal with the new data as it was coming in.”

The dynamic between a measure of risk that is stable versus one that is reactive begins to show its muscle in an environment like 2020, added Cowie.

“One of the takeaways is, you need to leverage all [the measurement tools] because they read different things to you. Reading them the right way in combination is pivotal.”

With markets experiencing the kind of noisy worst-case conditions that Basel II had attempted to prepare the industry for, careful monitoring and readjustment was necessary.

According to Chirayathumadom, market risk managers and their firms must be clear on the level of risk they are prepared to take to decide which signals should be addressed and which can be ignored. Revisiting one’s assumptions in modelling choices gives confidence in whether the noise you are seeing is actually influencing results.

“If you listened to just two models, you would think every firm that has counterparty exposure would end up on the wrong side of things. But, given the [governmental] stimulus and the nature of the firm’s expectation, that is not what we expected to happen, and that is not what, in fact, played out.”

So how do you correct your models for that simplistic relationship that is built in, based on historical data? “That is where a lot of manual overrides are needed to revisit and readjust those assumptions,” said Chirayathumadom.

Today, not only do firms need to reappraise their risk management models, but also test whether their software can handle newer types of inputs.

Software review

“Another interesting lesson was the need to reassess software,” said Sadak. “Can our software handle things like a negative price input? A lot of brokers got caught off-guard when oil prices were negative because, when people tried to unwind their positions, the software did not allow them to enter a negative price as valid.”

Reassessment, according to Sadak, needs to take place on two fronts. First on the modelling side to make sure that, mathematically, the models can handle various situations, and second on the software side to make sure these inputs can be handled.

Even with these measures in place, situations such as Covid, which no-one expected to be as all-encompassing or had anything that looked quite like it in the data, present a different challenge and require new ways of thinking.

“Using that history to help understand the vulnerabilities is an important element,” said Cowie. “As painful as it is to go through a stress like that, it does test the mettle of your risk management capabilities. It helps to identify your vulnerabilities that you can then improve upon.”

As markets become faster and more dynamic, firms will need the capability to leverage data as an asset, rather than looking at data as an input to deriving something else.

“Twenty years from now will be very different again, and we need to stay forward of and connected with that technological evolution, because the data of history is going to turn into a very pivotal change to the data,” Cowie added.

Sadak cites the example of SVAR and the importance of incorporating data from as many historical years as possible. “The more data we have to process, the more data we actually generate,” he said. “The ability to re-aggregate, [this data requires] completely different infrastructure to what we were using 10 years ago.”

Sadak concedes that not every firm can afford to invest money to rebuild its IT infrastructure. “That is where managed service software and software vendors come in to help – they have gone through this painful experience, they understand what cloud computing is capable of and how to properly leverage it,” he said, pointing to the growing number of customers seeking to run risk dispositions in the cloud and analyse the data using cloud infrastructure.

Dynamic risk and changing liquidity

And what of the future, where risk decision-making is moving towards real time? Risk is dynamic because it continues to evolve, says Cowie, citing algorithmic execution as an interesting example of how intraday market risk techniques are deployed.

“It is quite an interesting dynamic – the intersect between operational risk, market risk and model risk,” he said. “If you have very good operational boundaries that define where an automated trading platform can operate, then, to some degree, those operational controls represent your market risk controls because they set the boundaries on how and where you can take your risk profile. The boundaries you set and the strength of those boundaries inside the technology system become very pivotal to how you go about controlling it.” It is a function that many banks are now putting a lot of energy towards, he added.

Cowie also believes the dynamics of market liquidity have changed, with certain asset classes seeing changing fortunes partly due to macroeconomic factors, but also the impact of regulation.

“Ten years ago, doing single-name credit default swaps on non-investment grade was something you could do relatively easily. Now, it is a fairly difficult market to play in. Yet, in other places, liquidity has moved.”

Regulatory dynamics have changed. For instance, the Volcker Rule, which is a federal regulation, has taken an element of liquidity away from some of the banks, said Cowie.

“Banks may have possessed a bigger inventory in the past and, as a result, some form of lesser market risk. Now they have needed to revisit their inventory landscape, and that has changed the liquidity.”

Sadak makes the link back to algorithmic trading, pointing out that, whenever markets enter high periods of distress, a lot of algorithmic trading steps back and results in liquidity drying up. “Liquidity is not limited to any particular asset class. It is a dynamic beast, and we need to treat it accordingly.”

>> Watch the full webinar, *Modifying market risk management – A year into the Covid-19 pandemic*, at www.risk.net/7822446

The panellists were speaking in a personal capacity. The views expressed by the panel do not necessarily reflect or represent the views of their respective institutions.