Risky Business - the Importance of Understanding Your Trading Risk

Orc Software explores the area of risk management for trading amid heightened market volatility. It looks specifically at the importance of an effective pricing framework to underpin risk analysis; includes interview with Orc Software risk specialist, Markus Kämpe. *Edited by Orc Software CMO, Annie Walsh.*

During the last decade and more particularly in the past months, much has been said about identifying a trading firm's financial risk and defining its analysis parameters. A simple 'risk exposure' test for any financial firm is answering three questions. Firstly, 'do we know? Secondly, 'do we care" and finally, 'would we care if we knew'? If you answered yes to any or all these questions, then the short answer is you are at risk. In 2008, whether you're a large global bank or a small local trading firm, you must understand exactly where you are at risk.

More recently, financial market participants, fully exploiting the capabilities of automation, have excelled in repackaging and transferring risk. Latest market turmoil however, has forced us to rethink the way we assess risk and our exposure to a proposition of which we are uncertain. For trading firms, the importance of accurate analytics underlying their risk analysis has never been so great.

Profit and loss analysis, cumulative exposure, risk analytics framework; integration and operation... all vital ingredients for a firm's risk management, but at the end of the day the decisions of the individuals put in place to manage weigh heavily in creating a company's risk culture and ultimately its risk profile.

"Risk is either a trading firm's main asset or principle liability," says Markus Kämpe, Senior Product Manager at Orc Software. "As a trader you need to know your risk in order to trade your view of the market. If a directional trader believes in a short-term decline or rally in an underlying, then the trader seeks risk associated with the market price. If a volatility trader expects market volatility to decrease, the trader will also want to sell exposure to that volatility."

Trading firms today increasingly aim to view risk in a holistic manner. The more recent availability of advanced financial analytical tools are being used by quant analysts and sophisticated traders to give transparent, aggregated views on exposure to fluctuations in the market. The analytics make it possible for risk specialists to mix historical with current market data to project future risk exposure to instruments and underlyings.

One question many are asking is, given the current market turmoil how will risk requirements and measures change in order for there to be a shift away from unwinding to taking positions? History also tells us that, having overshot one way, there is institutional propensity to overshoot the other way as firms adapt to such a risk-averse environment.

> **"Risk is either a trading firm's main asset or principle liability."**

David La-Boucharderie, a senior risk management consultant, writes in 'Operational Resilience: The Art of Risk Management': "People, process, systems and external risks all need to be considered and the right continuity plan needs to be designed, put into place and tested thoroughly. But it's useless putting in a continuity plan...unless organizations have accurately and rigorously pinpointed all possible risk scenarios and assessed which of those will have the biggest impact."

Markus Kämpe points out: "We are now seeing much greater pressure on firms for the importance of risk management systems. Recent market moves in the extreme have precipitated thorough and rigorous analysis and assessment of risk. What has come to light is that most firms are actually increasingly focusing on the basics, that is, risk sensitivities and scenario analysis for their trading risk. The scenario analysis carried out by firms is definitely more extensive now, covering a wider

range of outcomes due to current uncertainty in the market. However, it is still important to have an open and transparent risk analysis beyond traders and risk managers."

Kämpe continues: "A significant challenge is presented to firms that base their reported risk on historical data; take for example a VaR based on historical simulation. When conducting this type of analysis it is important to have historical data that reflects the current market conditions, but at the same time, there is not a lot of data available due to the most severe effects on the market, aka the credit crunch, occurring during the second half of 2008. Rather than use generic black-box risk analysis based on (potentially questionable) historical data, we are seeing firms increasingly work with scenario analysis for risk management based on scenarios they believe reflect the current market conditions."

> "Sequoia Capital is an Orc client benefiting by the use of the Orc Volatility Model API"

Monitoring and Interpreting Risk Data

Risk managers require tools to monitor risk on an aggregated level and deliver instant information regarding a firm's total trading risk. Traders on the other hand, need full risk tools to ensure they make the correct trading decisions, stay in constant touch with their P & L, and understand where risk is paying returns.

Orc's real-time risk management tools enable users to view positions and risk on an aggregated level, selecting required risk values from the approximate 100 values available: for real time monitoring of P & L and risk calculations with full control of volatility surfaces and market prices used in the analysis; for P & L assessment of different risk value contributions; and to express risk from single-stock derivatives in index futures or index baskets. The open system architecture makes it possible to subscribe to risk calculations for use in external applications.

Typically, on-demand risk management tools provide intensive risk analysis and pre-defined scenario risk analysis capabilities to generate multi-dimensional minimum / maximum analysis of portfolios. With Orc's tools, comprehensive risk reports can be created; portfolio positions and risk values can be viewed on a strike and expiry date for each symbol; and the volatility curve can be viewed together with Vega and volatility model parameters risk per strike for any given portfolio across a range of asset classes.

With regard to the capabilities of Orc's risk management offering, Kämpe explains: "We have very good functionality that we believe is demonstrably superior to other market offerings. Users can look at potential scenarios and their instrument risk in terms of risk sensitivities, for example, to market volatility or futures prices. We also see many traders show interest in understanding the nature of risk they have traded into and its contribution to their P & L. Many of our customers take full advantage of the flexibility gained using a restrictive volatility model for risk analysis on a product, and at the same time using a permissive market tracking spline volatility model for generating quotes."

"We are now adding sensitivities to the volatility surface parameters a trader relies on and works with every day," Kämpe says. "Traders know these parameters intuitively and understand how they change over the lifespan of an option."

"All the risk analysis is based on pricing and volatility," he continues. "Therefore, one needs to have pricing and volatility models that fit the products a firm trades, as well as models that are technically solid to ensure the risk analysis or the risk values traders see on the screen are correct, current and can always be relied upon."

With particular strengths in the areas of Pricing and Volatility, Orc Software provides customers with off-the-shelf Pricing and Volatility Models as well as API's (Application Programming Interfaces) for easy integration of proprietary pricing and volatility models. Customers use the available Orc analytics to trade instruments such as listed options across all asset classes.

Sequoia Capital is an Orc client benefiting by the use of the Orc Volatility Model API. Managing Partner for Sequoia, Douglas Garistina says: "With the ever increasing requirements for maintaining Sequoia's screen presence in the markets, more sophisticated volatility modeling has gained significant importance for us. Orc enabling us to run our own models through the API has resulted in

Sequoia achieving our goal for an intuitive, fast and easy-to-use trader solution that requires minimal updating when the market environment changes."

With regard to the importance of data validation for risk management, Kämpe says: "An area within risk management that is not currently enjoying the focus we believe it should is data validation. No matter how sophisticated and efficient the risk analysis tool, unless the data used for analysis input correctly reflects the current market conditions, the analysis output will not reflect the true risk or P & L for a firm. An example of this error occurring is the major loss seen at large regional bank in 2007 when incorrect market data was used in the analysis to inflate P & L projections. A detrimental outcome such as this reinforces the importance of data validation for risk management."

> "The combination of the Pricing and Volatility Model APIs has really opened up new opportunities for Orc and its customers."

If you're a Risk Manager at a proprietary trading firm or bank that needs real-time risk analytics and trading controls, how do you currently access your consolidated data for market risk? How do you limit your trader's exposure? Would visibility for monitoring market exposure improve if you could access an extensive suite of reports to view individual or consolidated risk across trading desks and markets in real-time? Would operational risk be reduced if you could restrict trading activity by the definition of rule-based position limits?

Analytics

Due to its central role in risk analysis, what actually may determine the quality of risk sensitivities or scenario analysis is the analytics used for modeling the products traded. Having option fair values in-line with the market during quiet market conditions is actually not that difficult. What presents as the greatest challenge is having correct fair values in a very volatile market, such as markets we are seeing today.

Trading analytics is not only about the pricing models used for different products, it is also the pricing model together with the volatility model that needs to suit the product traded. If the combination of the pricing and volatility models doesn't fit the product traded, risk sensitivities and scenario analysis will give less accurate information, potentially exposing the firm to unintended (not to mention unrewarded) levels of risk. For a number of years, Orc has offered customers a Pricing Model API they can use to create proprietary pricing models for trading. At the end of 2006 Orc added a Volatility Model API to its analytics offering. The Volatility Model API development was a culmination of close work with customers to understand their growing analytics requirements related to electronic trading and risk management. Orc customers today use the Volatility Model API to implement their own proprietary volatility models.

"The combination of the Pricing and Volatility Model APIs has really opened up new opportunities for Orc and its customers. We see a lot of interest from market participants wanting to enhance their trading solutions by taking full advantage of these APIs," Kämpe says.

One example of Orc's contribution to enhance customer solutions is the introduction of a new pricing model for Short Term Interest Rate (STIR) options. In 2007 Orc added a pricing model in response to demand from mainly Eurodollar, Euribor and Short Sterling traders as an alternative to the market standard model already available in the software.

"The standard market model for STIRs does not fully reflect how the market really moves," Kämpe says. "The properties of the pricing model don't reflect the way the market works in practice and what the market prices look like, therefore forcing traders to frequently adjust the volatility surface."

He adds: "When using the market standard model, as soon as there is significant market movement, the dynamics of the implied volatility surface make it difficult to find a volatility model that can properly model the surface. For example, as the subprime mortgage crisis grew and the Eurodollar market really started to move, volatility traders relying on the market standard pricing model suffered. At the time, Orc contacted most of its STIRs trading customers to alert them to the existence of the new model that would help them better cope with the new market conditions. To their benefit, most Orc customers migrated to the new model."

The new development meant that firms using the model were able to reduce the time spent on updating volatility surfaces to overcome the shortcomings of the pricing model. As a result, firms can now focus more on gaining competitive advantage by trading STIR options and entering positions that correspond to their view of the market.

Kämpe continues: "Over many years financial firms have built up their knowledge of trading market volatility giving them the valuable intellectual capital needed to gain competitive advantage. Orc's opportunity here is to establish collaborative relationships with these customers, based on open communications and mutual trust, so that we can leverage expertise on both sides to accelerate development and deployment of their volatility models. Models built via collaboration are proprietary and not shared with other market participants. In a nutshell, we guide the customer so they can reach their goals using the Volatility Model API."

> "If you're not taking enough risk, you're not making enough money."

Via this collaborative approach, several Orc customers have successfully incorporated proprietary volatility models into the Orc system for different types of products in different regions. An increasing number of tier 1 and 2 customers have integrated volatility models with their Orc installation; comfortable in the knowledge the IC remains confidential.

To sum up Orc's position when it comes to capabilities for analytics, Kämpe says: "We're in a very good position right now, having won the trust of key customers to help them significantly improve the efficiency of their trading operations. This is further confirmation of the growing market reputation and customer reliance on the relatively recent addition to Orc's trading solutions with the Volatility Model API."

Proprietary trading firms are typically the type of financial institution that uses its own models to exploit identified market opportunities. These firms rely on Orc technology to make more effective use of their proprietary models.

"Orc is in a strong position to deliver analytics solutions that are significantly better than any other market equivalent. The built-in Pricing and Volatility Models combined with the open Pricing and Volatility Model APIs enable customers to trade with analytics, mitigating unwanted risk and enhancing success and competitive advantage. This also provides peace of mind for the customer, knowing their risk analysis is based on analytics that correctly reflect the market." says Kämpe.

Even in this new climate, the old adage remains true: "if you're not taking enough risk, you're not making enough money". The key therefore is simple - ensure your risk is understood, accessible, contained and managed based always on reliable data and solid analytics. ■