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SPECIAL REPORT: Counterparty Risk



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When Counterparties Fail

The demise of Bear Stearns and Lehman Brothers has thrown the default threat onto center stage. Credit risk is guiding trading strategies like never before as technologists scramble to provide the front office with real counterparty risk measurement. *By Joe Morgan*

When Bear Stearns collapsed in the spring of last year it completely changed the thinking of risk managers across the globe. Gone were the days when capital markets firms could simply focus their attention upon the risks of financial products blowing up. Buy- and sell-side firms now had to ask the question: Will the firm we are doing business with still be around tomorrow?

Anyone misguided enough to believe that it could still be “business as usual” in the capital markets after the demise of Bear Stearns had their illusions shattered when Lehman Brothers filed for Chapter 11 bankruptcy protection last September.

“Counterparty credit risk came to the forefront after Bear Stearns. The fact that even a major global bank could disappear scared everyone,” says Kevin McPartland, a senior analyst at consul-

tancy firm Tabb Group in New York. The collapse of giants in the financial world has completely changed capital markets firms’ attitude toward counterparty credit risk. It would have previously been unthinkable that a credit default swap (CDS) purchased from a bulge-bracket firm would become worthless in the wake of the bank failing. Now risk managers have to consider the dual threats of both the underlying financial risk that a CDS is taken out to protect against, and the risk of the bank arranging the trade collapsing. This has increased the overlap between risk management and trading like never before.

Market analysts point out that capital markets firms are increasingly providing traders with the facility to check with the firm’s credit risk models before executing trades. Those without automated processes in place to link a credit

department’s risk data with its trading desks are requiring traders to pick up the phone more often and speak with risk managers, particularly before executing major transactions.

Chicago-based complex event processing (CEP) technology vendor Aleri claims it has experienced a recent upsurge in demand—particularly among sell-side firms—for its suite of solutions. CEP technology consolidates trades, market prices, and settlement reports, enabling a firm to obtain an updated view of risk exposure in real time. In addition, a firm can impose pre-trade limits and caps on the exposure dealers can take with a particular counterparty.

“The bottom line is that many firms that have collected information in the past have not done so in a timely enough fashion,” says Jeff Wootton, vice president at Aleri in Chicago. He says the CEP system takes native data from



different risk and trading systems within a firm and aggregates it along different dimensions in real time. "From the consolidated view, you can then drill down all the way to the individual transaction level, managing trading positions and exposure in a certain asset class, location or with a particular counterparty."

Buy-side and sell-side firms have also been forced to replace risk models in the wake of the financial crisis. PJ Di Giammarino, CEO of JWG-IT Group, a financial services think tank based in London, describes the counterparty risk management framework used by capital markets firms a year ago as "fundamentally flawed." He says there is now a need for more timely and granular customer information on demand. "However, this higher quality data needs to be distributed across the firm without slowing down its trading desk. Reducing latency of changes in the customers' state is critical. Time is a luxury firms do not have," he says.

Bob Giffords, an independent banking and technology analyst based in the UK, says risk models now have to be redesigned and recalibrated for new correlation risks and to fit them into "the rapidly diminishing interstices between trades." He expects this to require more hardware along with a closer scrutiny of the links between financial products,

especially via liquidity, contagious market sentiment, or external political events. "Multi-model strategies may well start to emerge as we've seen for investment," says Giffords. Different models show different risk factors and



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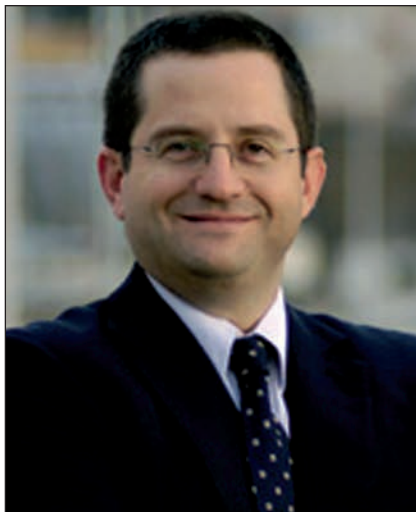
*Kevin McPartland,
Tabb Group*

are then weighted based on market or even political conditions. "When the market is jittery and trading is thin, sentiment models may dominate, while during more confident, liquid periods we would expect to see models based on fundamentals to increase their weighting," he says.

Rohan Douglas, CEO of Quantifi, a financial software vendor in London, says the current financial crisis has resulted in regional banks and many large buy-side participants adopting a sophisticated approach to counterparty credit risk that was previously the almost exclusive purview of bulge-bracket firms such as Goldman Sachs. Risk modeling techniques used to price financial instruments are being used to measure the counterparty risk on individual trades. However, Douglas says that firms scrambling to implement more stringent counterparty credit checks now in the wake of the current market turmoil are still in danger. "The main thing that will come out of this the financial crisis is that you really need these tools and infrastructure in place before a crisis takes place," he says.

MORE CPR POWER

Douglas says he believes that credit and counterparty risk will continue to loom larger in the minds of buy-side and sell-side firms, regardless of the current



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market turmoil. “The longer term trend will be that credit and the measuring of counterparty risks will be increasingly important,” he says.

Buy-side and sell-side firms’ increasing focus on measuring counterparty credit risk will provide technologists with significant challenges. Capital markets firms will have to gather more information on levels of risk exposure to counterparties and process it in a shorter amount of time while also distributing the information between credit risk and trading departments. “High-performance computing (HPC) technology is being used to crunch numbers faster. Whereas before a firm’s risk exposure would be calcu-

lated overnight it is now being done in just one hour,” says McPartland.

Capital markets firms are taking a two-fold approach to enhancing the computational power that can be used to power risk management systems: complex calculations are being spread out across multiple processors, while firms are also undertaking initiatives to more efficiently utilize their computing resources. Grid technology—which is already being increasingly utilized by capital markets firms absorbing cut-backs in IT spending—is being used to fulfill more risk management tasks. Instead of running models through Microsoft Excel spreadsheets on local desktops the number crunching is now being done in a grid environment. Server blades in datacenters are also increasingly being shared. McPartland of the Tabb Group says the “cloud computing idea”—where employees book a certain amount of processors for an agreed length of time—is gaining traction among capital markets firms. “This way you get access to what you need to do, such as carry out a report, before the computational resources go back into the pool,” he says. “The old way of doing things would be for a couple of servers to be used for two hours and then left idle for the rest of the day.” (*For more on cloud computing, please turn to page 46.*)

Buy-side and sell-side firms specializing in high-speed, high-frequency trading strategies are increasingly incorporating graphics processing unit (GPU) technology to reduce latency. GPUs were originally developed by Santa Clara, Calif.-based Nvidia to support 3D graphics in the computer gaming industry in 1999. The visual computing technology vendor has since launched its Tesla product to provide capital markets firms with high-performance computing solutions that can reduce the latency of risk management applications. “The use of GPUs is still cutting-edge,” says McPartland. “The firms that utilize this type of technology do not like to talk about it as they are often quite secretive about their trading strategies.” Bulge-bracket sell-side firms, proprietary trading firms and hedge funds are among those believed to be adopting GPU technology in their counterparty credit risk systems.

The use of GPUs can speed up number-crunching tasks such as performing Monte Carlo simulations for the pricing of derivatives. The technology is being used for data storage. For example, in an options contract, multiple data needs to be stored, including its strike price, whether it is a “call” or a “put” and the underlying security the option is linked to. “Different firms store

data on options in different ways. GPUs can be used to quickly turn the data into a consistent format in real time, enabling the information to be more easily analyzed," says McPartland. The technology is also being used to enhance and normalize streaming market data before it is transferred to risk models and algorithmic trading engines. The capacity to process data into a consistent format before being incorporated into a front-end trading system is becoming increasingly vital in the risk management processes of buy-side and sell-side firms, which increasingly rely upon different types of data from multiple exchanges and trading platforms.

CDSes GO ELECTRONIC

In October last year the Chicago Mercantile Exchange (CME) and Chicago-based alternative investment firm Citadel Investment Group unveiled plans to set up an independent electronic trading platform for trading CDSes. The platform will function as an electronic exchange for CDS trading, with CME Clearing acting as a central counterparty to guarantee trades. Major CDS market participants have been invited to join the platform as founding members by allocating up to 30 percent of the equity in the venture and committing to becoming market-makers when the platform is launched later this year.

Across the pond, the European Commission is spearheading drives for a centralized clearing model for derivatives instruments such as CDSes. Three exchanges are vying for this



Rohan Douglas
Quantifi

business: NYSELiffe, in conjunction with London-based LCH.Clearnet; Frankfurt-based Deutsche Börse's Eurex Clearing; and Atlanta-based IntercontinentalExchange (ICE), which is in talks with UK regulators about allowing its London-based ICE Clear Europe to clear CDSes. Nine of the major dealer firms in the CDS markets have committed to the use of central counterparty clearing for CDSes in Europe by July this year. In a letter sent to EU Commissioner Charlie McCreevy in February, the nine banks—Barclays Capital, Citigroup Global Markets, Credit Suisse, Deutsche Bank, Goldman Sachs, HSBC, JPMorgan, Morgan Stanley and UBS—agreed to work closely with infrastructure providers, regulators and the European Commission to resolve technical, regulatory, legal and practical hurdles. Each firm will make its own

choice on which central clearinghouse or houses might best meet its risk management criteria.

A source who works for a trading technology vendor that is providing technology from its core credit risk platform to some of the parties involved in the current bidding war to become a central counterparty for CDSes says market participants are "waking up to the fact that counterparty credit risk is real." The source—who reports a recent increase in demand from insurance companies for credit risk solutions—says: "There will be increasing moves toward a centrally cleared infrastructure for liquid products in the capital markets while more bespoke instruments continue to be traded on a bilateral basis."

The demand among market participants for a centrally cleared model for the trading of credit products is likely to increase as volatile financial markets remain unstable and in uncharted territory, with traditional providers of liquidity such as hedge funds retreating from the market place. These conditions will also result in greater investment in risk management technology as firms try to navigate—and survive—the current market conditions. Developing risk and trading models that provide appropriate levels of protection against the risk of default—while also enabling the firms to profit from the turbulent market terrain—will be vital.

Observers note that this will make latency increasingly important as capital markets firms monitor their trading positions in real time. Few risk managers will be willing to wait until the next day before checking up on exposure to any counterparty, no matter how big the name.

After all, no investment firm wants to be the next Lehman Brothers. ■



Managing Counterparty And Settlement Risk In Real Time

In the current economic climate, firms are rushing to find solutions that allow them to manage counterparty and settlement risk in real time. *By Jeff Wootton*

Two features of today's markets—volatility and the heightened risk of counterparty failure—have prompted trading operations to look for better tools to manage their exposure.

A year ago, the idea of managing exposure and limits in real time, rather than end-of-day, was seen as a “nice to have”—but not a priority. With the current state of the markets, some firms are now moving quickly to put real-time systems in place.

LIMITATIONS OF TRADITIONAL SYSTEMS

The challenge of managing trading positions and limits on a real-time basis is that traditional systems are based on relational database technology. Relational databases can process individual transactions in real time but are not capable of providing views of aggregate trades and positions, across different dimensions, in real time. When you add the need for real-time mark-to-market, you have pushed even further beyond the capabilities of conventional data analysis technology.

REAL-TIME MONITORING ACROSS MULTIPLE DIMENSIONS

This has caused firms to look to Aleri's event-processing technology—also known as complex event processing, or CEP—which is designed to consolidate, aggregate, and analyze event data in real time. In this case, the event data typically consists of three streams of data: trades, market prices, and settlement reports:

- As trades occur, the transactions are streamed into the event processor. Trading data arriving from multiple trading platforms may arrive in different formats, so the first job of the event processor is to normalize the data into a common format. Trades are then aggregated with other trades across different dimensions.
- A live stream of market prices can be applied to value positions and exposures.
- Settlement reports can be applied to remove positions or

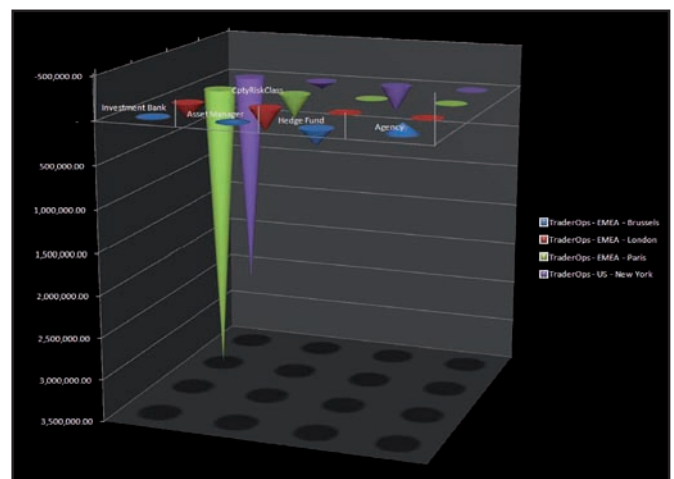
obligations that no longer exist.

Aggregating across different dimensions allows the firm to manage multiple types of risk:

- Counterparty Risk—Trades can be aggregated by counterparty to monitor the total exposure to each. With the addition of corporate hierarchical data, data can be rolled up to parent entities to monitor exposure across related entities.
- Settlement Risk—Brokers may only be interested in monitoring exposures based on open trades, removing those trades from the system upon settlement. Given current market volatility, market prices can be used to value trades at “replacement value” rather than the original trade value.
- Operational Risk—Aggregation of trades by trader, desk, or region can provide tighter monitoring and management of limits.



Jeff Wootton, Aleri



ROLL-UP AND DRILL-DOWN

Aleri extends the conventional notion of event processing with its Live OLAP server that is directly integrated with the event processor. Like conventional OLAP or “business intelligence” tools, the Aleri Live OLAP server allows a user to analyze data at any level of aggregation, and across different dimensions. Data can be analyzed by counterparty, sector, trader, asset class, and so on—with hierarchies applied to each of the dimensions, specifying how the data gets rolled up into aggregate values. This capability to “roll up” and “drill down”—including going all the way down to the individual transaction level—provides greater insight than a system that merely provides top-level summary data.

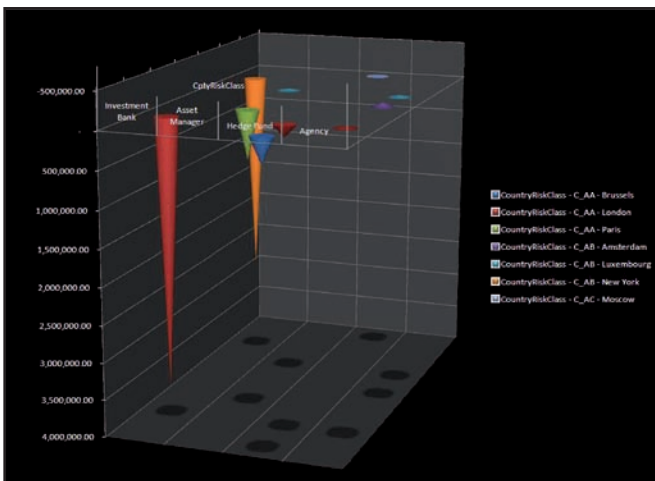
Analysis of the real-time positions can help a firm monitor and limit concentration, detecting “hot spots” that represent unacceptable levels of exposure to specific sectors, asset classes or counterparties. With drill-down, the analyst can determine the underlying cause of the concentration, right down to individual trades. “What if” scenario testing can be done by changing assumptions and inputs to see the overall effect on limits and concentrations.

The difference between the Aleri Live OLAP system and conventional OLAP technology is that the data set being analyzed is live—i.e., the event processor continuously updates it, and the data aggregation is done on the fly.

MANAGE LIMITS AT MULTIPLE LEVELS

Finally, and perhaps the feature that has generated the most interest, is the application of limits to the system, with real-time limit monitoring and non-linear aggregation. Limits can be set at any level of the data hierarchy and across any dimension. Non-linear limit aggregation allows for more effective use of limits, since limits can “overlap” at lower levels of the data hierarchy.

When managing limits for individual traders, a firm might want to give each of five traders a limit of 100, but set a desk limit of 400. The same could be applied to the counterparty hierarchy, where individual entity limits are set such that, in aggregate, they total more than the limit set for the parent. This provides for more effective use of limits, since additive limits typically result in unused capacity.



Limit management can even be extended to pre-trade limit checks, assessing the acceptability of a trade based on current limits and concentration rules.

REAL-TIME IS WITHIN REACH

Moving from end-of-day monitoring and management of limits and exposures can be easier than it seems, thanks to the availability of Aleri event processing and Live OLAP technology.

The event-driven architecture allows for non-intrusive integration with existing systems, and Aleri provides a range of connectors to ease the integration process. Alerts can be distributed via message bus, displayed on a dashboard, or sent out using e-mail, SMS, or instant message. Standard JDBC, ODBC and ODBO interfaces allow for use of off-the-shelf data analysis and reporting tools.

JEFF WOOTTON is vice president of product strategy and has been with Aleri since 2005. Jeff is responsible for developing targeted product strategies across multiple markets. Prior to Aleri, Jeff was a senior vice president at Reuters and at Infodyne Corp. He holds a bachelor of science in computer engineering from Purdue University and an MBA from Indiana University's Kelley School of Business.

The Aleri Answer

Aleri's CEP-powered solutions help translate real-time data into insight that enables the financial industry to respond faster to changing conditions and to make better decisions through more timely information. Global financial institutions are using the following Aleri CEP and CEP-based solutions for trading and risk management:

- The Aleri CEP platform—This solution allows for rapid development of real-time trading and risk monitoring applications including settlement and counterparty risk with real-time limit monitoring, real-time portfolio evaluation, and real-time risk aggregation across multiple systems and asset classes, market data enrichment.
- The Aleri Liquidity Management System (LMS)—This platform provides end-to-end real-time management of cash and liquid assets to reduce short term liquidity risk and ensure optimal funding.
- The Aleri Market Liquidity Analysis Server—This solution provides consolidation and analysis of depth in a fragmented market with an extensible model that can drive trading strategies and smart order routing.

In addition, Aleri will soon be releasing the Aleri Liquidity Risk Manager (LRM), which will provide a flexible liquidity stress-testing environment that enables banks to model stress events and gain insight into how different scenarios impact the bank's liquidity exposure and assets value.