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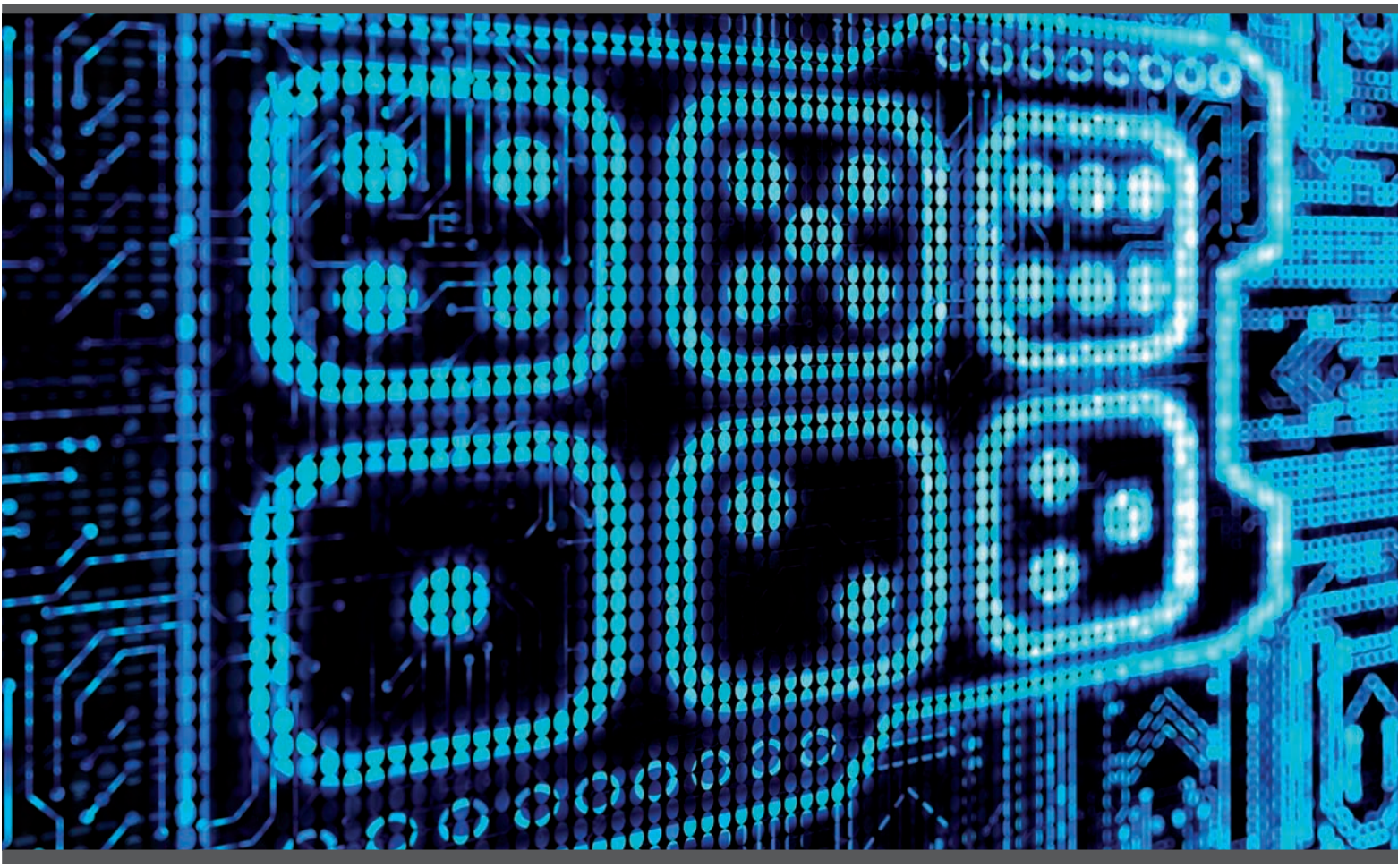
Risk & Compliance
Special Report



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Preparing to Be Seduced

I reckon almost everyone with a risk-related role in a buy-side or sell-side firm is fed up to the hind teeth with hearing how poorly prepared they were when it came to dealing with the unprecedented challenges thrown up by the credit crunch and the ensuing financial crisis.

I guess our industry has more than its fair share of Monday-morning quarterbacks, although you'll be pleased to hear that I have little interest in joining their ranks—the speed and severity of the financial crisis caught everyone unaware and even the self-proclaimed soothsayers of Wall Street weren't sure which way was up during the height of the crisis.

But what, as an industry, have we learned through the tumult? Sure, counterparty risk is now a term that applies as much to the sell side as it always has to the buy side, and modeling liquidity risk—arguably the greatest threat to any financial services organization because of the speed at which it can hit—is about as easy as herding cats.

But what about other day-to-day risks that need to be managed in parallel with firms' trading practices? This is the realm of real-time risk management, a concept sure to seduce even the most battle-hardened risk manager, made possible by recent advances in computing hardware and data management practices.

But is putting a dollars-and-cents figure on your risk exposure, on an ongoing intraday basis, something that Value at Risk (VaR) calculations attempt to do, all that it's cracked up to be? And perhaps more pertinently, now that we're on the cusp of realizing this ideal, is there a genuine business need for carrying out close-to-real-time VaR calculations? For the time being, the jury's out. ■

Victor Anderson
Editor-in-Chief

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IBM Pulls Off Coup Through Algorithmics Acquisition

IBM has announced an agreement to acquire Toronto-based risk management technology provider Algorithmics, in a deal worth $387 million.

Algorithmics provides risk analytics software and advisory services to firms such as The Allianz Group, HSBC, Nomura, Société Générale, and Scotia Capital. This move is designed to expand IBM's involvement in the financial services industry with a particular focus on risk technology, along with its acquisition of OpenPages last year.

"Today's economic environment demands that financial institutions have more cash on hand, a better understanding of their financial standing, and the ability to deliver more transparency to stakeholders," say Rob Ashe, IBM general manager, business analytics. "Combining Algorithmics' expertise with IBM's deep analytics portfolio will allow clients to take a more holistic approach to managing risk and responding to economic change across their enterprises."

As part of the deal, 900 Algorithmics employees will join IBM's software group.

Algorithmics, founded in 1989, started life as a sell-side focused risk technology provider, selling large, enterprise-wide platforms to tier-one banks. More recently, however, Algorithmics has found traction on the buy side, especially after its 2007 launch of the Algo Risk Service, which has won the Buy-Side Technology Award for best buy-side risk/portfolio management product for the past three years.

Volatility, Vega and German Efficiency

Delta and Gamma risk are primary concerns for investors in today's volatile markets, although Vega risk is often overlooked, according to Laurence Wormald, head of research at SunGard APT. "Everybody knows how to calculate Delta and Gamma on a derivative position," he says. "With Vega, everyone assumes that it's going to be small. But when volatility spikes, as it did in the first two weeks of August, Vega risk—that is the amount your derivative has changed just because of volatility—can make a huge difference."

This isn't news for some national regulatory bodies, such as the Bundesanstalt für Finanzdienstleistungsaufsicht (Bafin) in Germany, according to Wormald. "Pretty early on, the Germans developed a derivatives regulatory framework, which became known as the most aware [sophisticated] in Europe," he says. "When there was a bit of a panic about derivatives eight to 10 years ago, Bafin showed itself to be one of the best regulators in terms of understanding what you really need to do with derivatives—you don't ban them, but you do ask for evidence that people understand the risks that they're taking with such instruments."

> **"When volatility spikes, as it did in the first two weeks of August, Vega risk—that is the amount your derivative has changed just because of volatility—can make a huge difference."**
> **Laurence Wormald, SunGard APT**

Bafin recently issued revised minimum requirements for risk management and a tightening of reporting guidelines—Mindestanforderungen an das Risikomanagement (MaRisk). This prompted AmpegaGerling Investment GmbH, the investment arm of the Talanx Group, to work with SunGard APT to develop a bespoke solution in response to the new rules. "Those regulations ensure that you think about every aspect of the risk—not just the obvious aspect of the price changing, but other things too, like right now, we're seeing a volatility spike, and that's causing a big change in derivatives prices," says Wormald. "We spent a long time working with Ampega to develop a specific surface model for Vega, which ensures they are not just compliant, but actually ahead of the game. And the regulators seem to have recognized that."

Real-time Monitoring, Simulation Functionality Added to Kiodex

SunGard has added Kiodex Control, a real-time position and margin-monitoring component, to its Kiodex risk management solution.

The component aids the monitoring of position limits and margins in real-time, with built-in alerts for when thresholds are reached. It also provides functionality for simulations using up-to-the-minute data.

In addition, Kiodex Control helps to ensure compliance, according to the vendor, in that it allows customers to stay within limits imposed by regulators and exchanges. The solution as a whole is offered on a software-as-a-service (SaaS) basis, in line with SunGard's initiatives in this area.

"In today's increasingly regulated and volatile market, compliance and risk management are absolutely critical to our customers' success," says Kirk Howell, COO for SunGard's Kiodex unit. "Kiodex Control will help our customers better manage risk by providing access to accurate, real-time information, helping them manage positions, profit-and-loss (P&L), and margin in real-time."

New SEI Tools Help Firms Comply with Ucits

SEI has launched a number of new tools designed to assist investment managers in meeting mandatory requirements under the Undertakings for Collective Investment in Transferable Securities IV (Ucits) Directive.

The Oaks, Pa.-based buy-side vendor has developed an online solution to simplify the production and servicing of the required Key Investor Information Document (KIID), while also enhancing its portfolio compliance-monitoring system to account for Ucits-specific investment restrictions.

Under the Ucits IV Directive, asset managers will be obliged to replace their current prospectuses with a KIID for their Ucits products. The introduction of the KIID is aimed at promoting transparency and uniform standards across EU member states, with documentation provided in each jurisdiction's home language and limited to two pages.

SEI's web-based application provides a standard template designed to meet the regulatory guidelines. SEI also offers assistance in writing and translating the KIID into the local language as prescribed by the regulations.

SEI has also made additional enhancements to its portfolio compliance-monitoring system, which has now been designed to test Ucits investment restrictions on an automated basis. These Ucits-specific tests are part of a library of nearly 100 compliance tests and benchmark comparison functionalities.

The system allows the client to determine certain thresholds of risk and exposure based on daily positions and trades, and results can be reported on a daily basis in both a summary and detail report.

Deutsche Postbank Implements Adaptiv for Monte Carlo VaR

Deutsche Postbank AG has gone live with SunGard's Adaptiv Analytics for calculating Monte Carlo Value-at-Risk (VaR). The software will support Postbank's on- and off-balance sheet capital market activities.

Postbank is using Adaptiv Analystics in conjunction with SunGard's Risk Cube, which was implemented in 2009. The combination allows the bank to assess risk from an enterprise level down to an individual basis.

"Our aim is to have full transparency and an in-depth understanding of the sources of risk, including extreme event scenarios," says Guenther Fiebach, head of market risk and risk analytics at Deutsche Postbank. "The combination of SunGard's Adaptiv Analytics and Adaptiv Risk Cube has helped us improve our risk management with the ability to calculate and analyze over 30,000 risk simulations per trade across our risk factors. This transparency and the openness of Adaptiv Analytics will help us meet the challenges of regulatory and market changes. In addition, having a consistent view on the relevant positions and the associated market risks across the enterprise helps us assess, monitor and act upon market risks and opportunities quickly, thereby enhancing productivity."

Prosiris Taps Quantifi for Risk Management

Prosiris Capital Management will employ Quantifi's risk management solution for risk analysis and reporting. The New York-based hedge fund will use Quantifi Risk to provide valuation, scenario and risk-sensitivity testing.

"Given the sophistication of our trading strategy, the key factors in selecting Quantifi Risk are industry-leading analytics combined with flexibility and usability," says Jerry Chang, CFO of Prosiris. "We were impressed with Quantifi's extensive product coverage as well as the speed and accuracy of its models. It's important for us to obtain a solid infrastructure for managing and reporting risk. By partnering with Quantifi we now have the opportunity to focus our capital and time on our core business rather than spending time and resources developing an internal solution."

Prosiris was established in 2009 by ex-Goldman Sachs prop trader Reza Ali.

Oakpoint to Offer Contract Management for Bloomberg Clients

Hedge fund services firm Oakpoint Advisors is now offering contract management services for Bloomberg Tradebook Customers

"Hedge funds of any size are required to negotiate, file and eventually access, documents and trade relationship agreements via secure channels," says Peige Katz, partner and head of the regulatory and compliance team at Oakpoint Advisors. "With investors demanding more transparency, hedge funds—which are operating in a continuously changing regulatory environment—need an efficient and cost-effective way to easily execute and implement such documents. By integrating our offering, Bloomberg Tradebook clients will have access to a simple solution to continuously track terms across multiple counterparties and contracts."

Users will be able to execute and transact financing and trade agreements including prime brokerage, International Swaps and Derivatives Association (ISDA) and repurchase agreements, according to the New York-based firm. Oakpoint adds that this partnership will allow firms to reduce legal expenses and create efficiencies for searching and filing agreements.

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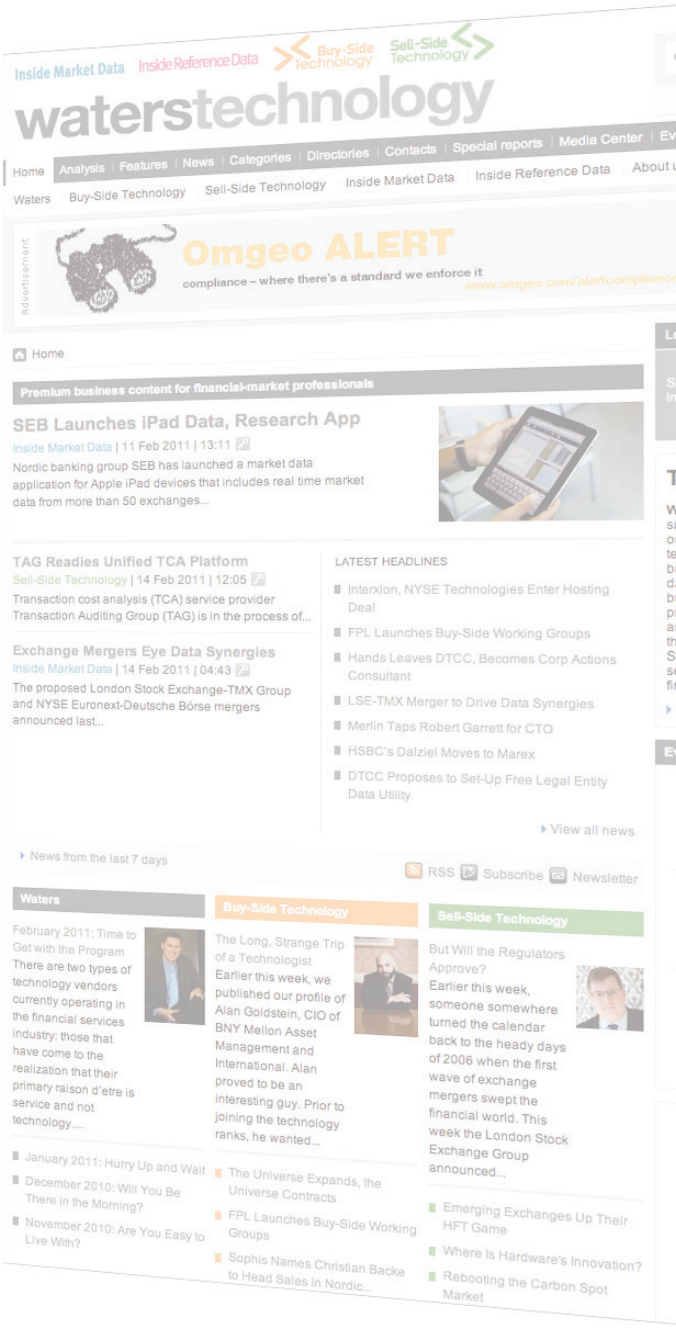

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KIID Requirements Cause Headaches for Funds

The complex nature of Key Investor Information Document (KIID) compliance can cause logistical and financial pressures for buy-side firms, according to Simon Cornwell, sales and marketing director at Vermilion Software, although he adds that the process can be streamlined through the efficient use of technology.

Growing out of the level-two measures from the Ucits IV directive, which came into force in July 2011, the requirements for producing a KIID are particularly strict: The document itself needs to be written in plain English so as to avoid confusing jargon, there are restrictions on its length—two pages, or three for structured funds—and not only does it need to be updated frequently with data changes, but it also needs to be translated multiple times. "There are a number of complexities and requirements involved with KIIDs," Cornwell explains. "For example, each KIID has to be translated into the language of all countries that the company sells into, assuming that the client has not opted for a representative fund. With a client company that sells into 10 different countries—France, Germany, Italy and so on—each one of the share classes in which they offer the fund will require a translated KIID report."

A KIID is divided into specific sections that must be adhered to rigorously in order to comply with the regulation. These are a fund's objectives and investment policies, its synthetic risk and reward indicator (SRRI) profile, fees and charges, past performance, and practical information. Although the document is a direct evolution of the previous Simplified Prospectus—seen by European regulators as too complex—the sheer volume of work needed to produce these documents is debilitating for buy-side firms, not to mention the prohibitive cost of professional translation.

"There are a number of companies that aren't actively looking for solutions yet, and their challenge will be finding the right solution and then managing the translation costs, which could be huge with the wrong vendor," says Cornwell.

> "There are a number of companies that aren't actively looking for solutions yet, and their challenge will be finding the right solution and then managing the translation costs." **Simon Cornwell, Vermilion Software**

The costs of non-compliance can be severe, with penalties levied for even small infractions, according to Cornwell. "Companies can face fines for a number of reasons if they don't adhere to Ucits requirements—things like fonts need to be between eight and ten points, and the restrictions on color, the number of pages and other specifications," he adds.

Report Highlights Data Management Pitfalls

A siloed mentality and poor data quality levels within firms remain two of the most acute data management challenges institutions have to overcome to enable a more near-real-time risk management environment, according to a report released by research firm Lepus and business analytics software provider SAS.

The report finds that despite the fact that firms are looking into data management and quality improvement, more has to be done to facilitate a real-time environment.

London-based Duncan Ash, marketing manager, financial services at SAS, explains: "There is a big data quality and timeliness issue at the moment, and effective data aggregation is a must prior to being able to run any analytics—you can't do the analytics until you are confident you have an accurate view of all your different positions and trades."

While the financial institutions included in the research did have plans, and in many cases were already focusing on data management and quality improvement, the real-time approach is yet to be fully embraced in some cases. "Firms do focus on data quality across the board, but the batch overnight mentality remains," says Ash. "They are focusing on high-quality data for tomorrow, rather than for right now."

Data Issues Delaying Liquidity Risk Progress

The successful development of effective liquidity risk management strategies is threatened by outstanding data management issues in the industry, according to a survey published by Swift in a white paper on managing liquidity risk.

Survey respondents consisted of 40 cash, liquidity, and liquidity risk managers. They identified six key data management challenges that must be overcome to provide management with the data necessary to manage liquidity risk.

Lacking a view of intraday cash positions across currencies, and ready-made liquidity risk analytics and business intelligence were cited as the highest challenges by 93 percent and 91 percent of respondents, respectively.

A lack of advanced interactive cash and collateral management functionalities within payments infrastructures was cited by 89 percent of respondents.

The ability to build predictive positions in intraday views of unencumbered collateral positions including margin calls was cited by 88 percent, and 82 percent cited inability to manage and report liquidity positions at a firm-wide level.

Capital Markets Data Genome Problem

Much like human DNA, data in the capital markets can wreak havoc when something goes wrong, and the consequences can be devastating. How can firms guard against this risk?

By Stuart Grant


Stuart Grant
Sybase

Data is to capital markets as DNA is to the human body. No one understands it in its entirety, few understand its structure well, many know the important areas, and the rest just assume it's always right and everything will be fine. Occasionally, in both cases the structure or accuracy of its implementation goes wrong and the impact can go unnoticed, or have significant and life-changing consequences.

In recent years, there have been countless reports from regulators, industry bodies, analysts and vendors about the importance of data. All cite the need for improvements in quality, volume, velocity and consistency. The IIF Steering Committee on Implementation (SCI) report in December 2009 on strengthening practices for a more stable system, mentions the importance of data on almost every one of its more than 100 pages. These often refer to organizations' needs, or in some cases attempts, to improve volume and quality of data as well as aggregate it from multiple systems. This is a direct result of the distributed nature of data where organizations develop silos, either through "in-function" collection for their needs or the complexity added by mergers and acquisitions. The report also highlights a lack of granularity in much of the risk data as well as collection of better data for indirect exposures to improve the accuracy of off-balance sheet analysis.

While many organizations have implemented projects to tackle issues around risk, for many the extent of the problem is still largely unknown and therefore misunderstood. Organizations have varying degrees of expertise and knowledge of the life blood that keeps their organization going, with many trying to mix the various different blood types in order to make up the requisite amount needed.

In 2010, the issue of data seemed to shoot to the upper echelons of the organizational structure. Suddenly, organizations undertaking risk transformation projects had to think beyond the needs for cultural, process or structural changes to risk management. They also had to know how data flowed and what state it was in upon reaching the boardroom in the shape of reports. With board members now needing to understand risk analysis of their business, the reports required for their meetings are more dynamic, with information never used before. This need has pressured the reporting side, which has previously relied heavily on libraries of pre-prepared reports, to now turn the wheel fast enough to generate these dynamic reports.

"Data is to capital markets as DNA is to the human body. No one understands it in its entirety, few understand its structure well, many know the important areas, and the rest just assume it's always right and everything will be fine.

Data is one of the most powerful revenue generators. Part of every project's consideration always comes down to cost and reward. Historically, firms have managed data requirements in functional silos due to technical limitations of underlying architecture to support multiple user communities' requirements. A single definition isn't practical, so mapping the data genome becomes increasingly difficult, and expensive, as you include multiple user groups, business lines and geographies. Even established data aggregators struggle to integrate the vast amount of data they collect and distribute with the right definitions and language. Market data providers have made significant strides in improving quality and transparency of price and related data recently. What this doesn't help with is the swathe of internal data the organizations have generated over the years using a variety of methods, models and people whose knowledge may no longer exist within the firm.

Organizations achieving a single version of the truth within the data architecture, accessible by many user communities on-demand, can achieve significant cost savings. These cost savings come initially from the reduction in operational costs, then through improved decision accuracy from use of the same data, and from there you improve revenue generation. Functions traditionally considered downstream of the front office, such as middle-office risk or liquidity management, can become services back to the front office—all updated in real-time. It is delivered with the same information available, dynamically, in whichever report, model development, or regulatory request as needed.

There needs to be a recognized role, such as the chief risk officer (CRO), managing data across enterprises. The effort needed differs depending on the organization; tier one sell-side firms have good practices but are weighed down by infrastructure and mergers. Buy-side firms are becoming more sophisticated in using data to drive their businesses by putting pressure on their asset-servicing provider or bringing it in house.

The disparate knowledge and approach across firms does require a regulatory body or commercial data provider to prescribe the necessary standards, controls and incentives to complete projects in less time it takes to map out. ■

Stuart Grant is financial services business development manager at Sybase.

Once Bitten...

Risk management techniques took on new levels of importance in the wake of the financial crisis, as many buy-side and sell-side firms realized their practices weren't up to the task of calculating their exposures in an acceptable timeframe. Now, firms are grappling with more acute risk challenges like modeling liquidity risk and managing exposure on a "rolling," intraday basis.

Q With the prevalence of high-frequency trading activities across both the buy side and the sell side, what are the challenges facing firms when it comes to managing their risk on a pre-trade basis?

Philippe Thomas, managing director, Ullink: Most high-frequency trading activities are very sensitive to latency because a trade opportunity may disappear if you are not fast enough. However, trading firms have to take into consideration the regulatory environment and the new Securities and Exchange Commission's (SEC's) market access rule. Therefore, firms need to strike an effective balance between the twin demands of low execution latency and flexibility through risk management. The issue here is the equation of spending more money by adding a risk system and adding latency with the risk of reducing profit. It is a difficult equation to have a positive outcome. Given this equation, the challenge resides in spending the least amount of money on an efficient risk system that provides the least amount of latency.

Richard Phillipson, director of institutional consulting, Investit: The challenge is that firms want to balance the time taken on pre-trade risk controls against their perceived loss of opportunity while the controls are being run. This is true whether firms are conventional portfolio managers or high-frequency traders (HFTs). The issue for the HFTs is that they have the opportunity to get into more trouble more quickly. The challenge is to get the balance right.

Sang Lee, co-founder and managing partner, Aite Group: I am not sure that better managing pre-trade risk is dictated by the proliferation of high-frequency trading. I think this has more to do with wide adoption of electronic trading and market fragmentation in general and each market participant must be quite vigilant in terms of ensuring that their overall trading activities stay within the framework of their compliance mandates. As firms deal with multiple venues in a millisecond/microsecond trading environment, robust automated pre-trade risk checks can go a long way in managing firm-wide risk exposure.

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Keith Wood, head of strategy and global solutions, Sybase, an SAP Company: The biggest challenge in a high-frequency environment is that everything changes at much higher frequencies. That possibly sounds like an obvious conclusion and it is. Down at the nitty-gritty detail level input/output to a disk is going to kill your latency. Not being able to maintain sufficient data in-memory means there will be some risk criterion that you missed, or some update that did not get to your decision chain fast enough. High-frequency trading is a non-trivial activity. Managing risk in also non-trivial and the combination of high-frequency risk management means that you have to architect solutions in this environment using best-of-breed components in highly optimized ways.

David Easthope, research director, securities and investments group, Celent: From the sell side, compliance with the order book rules—number of cancellations, order types—of the various destinations and pre-trade risk filtering for their direct market access (DMA) clients is the primary challenge.

James Heinzman, managing director of securities compliance, NICE Actimize: Managing risk on a pre-trade basis presents significant challenges for both buy-side and sell-side firms. The biggest challenge for the sell side is balancing the responsibility to monitor and control trading activity that flows through their pipes with the need to provide high-speed/low-latency access to the market. Firms that provide access to the marketplace to their high-velocity trading clients—most of which are buy-side firms—risk losing business if their risk control creates appreciable latency.

In contrast, buy-side firms are under increasing pressure from their sell-side brokers to certify their own pre-trade risk controls in order to be granted access to the market through the sell-side pipes. In essence, regulators have put the responsibility on the sell side to ensure there are adequate risk controls in place for order flow that is facilitated through their pipes, and sell-side firms are in turn applying pressure to their buy-side clients to shoulder the burden of implementing reasonable pre-trade risk controls.

Ashley Whitney, principal consultant, Lab49: The sell side needs to ensure that their clients are trading within credit limits or against posted collateral. They also need to ensure that where they provide sponsored access to exchanges, clients are complying with the exchange requirements for pre-trade risk controls. The buy side doesn't want their algorithms to be slowed down as it puts them at a competitive disadvantage to firms with fewer checks, so they would prefer the checks to be mandated at the exchange level—i.e. predictable and uniform among market participants. Another challenge is that such checks can slow down rapid liquidation of large positions.

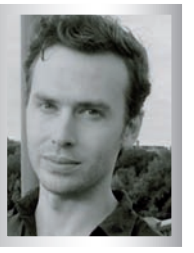
Q Is it reasonable to expect high-frequency trading organizations to manage their risk on a pre-trade basis, and if so, how do firms develop a pre-trade risk practice/framework without it negatively impacting their trading latency?

Wood: Not only is it reasonable to expect that risk is adequately implemented in high-frequency environments; it should be mandatory, regulated and controlled. When I drive my car, I have to wear a seat belt. When I don't, by law, points are added to my license and I pay a fine. If I accumulate a certain number of points, the government can revoke my driving privileges. The tools and architecture components exist to enable the development of adequate controls in these environments. Institutions that are not able to do this should be prevented from participation.

Easthope: From my perspective, it is reasonable to ask shops to have the necessary policies, procedures and tools in place to ensure compliance with rules. From a competitive standpoint, these firms must adopt technology to ensure that latency is not affected.

David Easthope
Celent

Whitney: With HFT there is the risk of significant trading losses, especially in light of unexpected behavior by inter-connected trading systems resulting in flash crashes. Thus, firms have no choice but to manage risk in real-time to prevent taking unexpectedly large positions. Managing risk after the fact or on a post-trade basis is appropriate for managing overall sector or interest-rate exposure, but basic checks on order sizes and rapid position build-up is critical.



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Hardware-based solutions have a role to play here, but the key thing is careful algorithm design to check risk limits using simple calculations.

Thomas: Yes, some high-frequency trading shops already manage their risk on a pre-trade basis. The impact may be minimal if the risk is coded within their algorithmic system. However, when they use a broker-dealer to access liquidity pools, the broker-dealer is required to add another level of pre-trade risk to be SEC compliant, and this piece might be more damaging in terms of latency. Moreover, some broker-dealers will pass on their costs of adding a new risk system to their buy-side clients. The alternative relies on new technologies such as field-programmable gate arrays (FPGAs) where the additional latency is counted in a handful of microseconds. Ullink (ISV) or Deutsche Bank have proven their technology to be very efficient and fast.

Phillipson: Let's turn the question up the other way. Would you sanction committing capital to dealing/trading without pre-trade risk and compliance checks? It is reasonable to expect pre-trade risk and compliance and we will have high-frequency compliance to go with high-frequency trading. Compliance and risk optimization rules will just be two categories of rules built into the trading approach.

Lee: I think it's completely reasonable and I would imagine all the major HFT firms would argue that having a reliable, low-latency pre-trade risk framework is an essential part of their overall trading operations. One must remember that most of the HFT folks end their day flat, and real-time risk management is their core business to ensure profitability. What the HFT firms—and for that matter, all of the other market participants—would be against is a set of regulatory rules that would insist on real-time pre-trade risk controls for specific group of market participants, while ignoring others. As long as everyone is under the same regulatory framework, HFT firms would be able to leverage their technology prowess to remain quite competitive and successful.

> "Leveraging an enterprise technology platform like ours enables firms to bring together data, define aggregation rules, and deploy a single, normalized view of the firm's risk by ingesting and normalizing risk inputs from the various risk-monitoring systems across the firm. This approach provides a unified view of specific risks across the firm while leveraging and augmenting your existing technology stack."
> **James Heinzman, NICE Actimize**

Heinzman: Yes, but this is a major challenge at the crux of the high-frequency trading business model where speed to market has a huge impact on profitability. The risk mitigation strategy that we often recommend to our clients—both buy-side and sell-side—is to create a framework using high-quality, low-latency analytic tools like ours to implement risk filters that sit between the order management system (OMS) and the market center that provide basic risk tests such as total trade size (no "fat finger" trades), orders to cancellation ratios, and similar filters on a pre-trade basis. This strategy would then be complimented by a more robust near real-time, zero-latency monitoring technology that would essentially take drop copies of FIX messages and run more complex risk controls for things like market price manipulation, marking the close, and wash trades. The main idea is to put into place a very light set of risk analytics on a pre-trade basis that pose minimal latency and deploy more robust surveillance controls on a near real-time basis. This strategy will enable firms to demonstrate reasonable controls by blocking potentially market disrupting activity in real time and identifying other potential risks in a timely way.

Q What are the challenges facing financial institutions in developing a cross-asset, firm-wide view of their risk exposure?

Laurie Berke, principal, Tabb Group: There are significant legacy challenges to cross-asset, firm-wide risk management within global financial services firms, even three years after the collapse of Lehman Brothers. First and most importantly is that enterprise data has yet to be completely standardized across business units within financial services firms. From security identifiers to client and sub-account identifiers and mapping, there has been little to no continuity across markets, asset classes, regions and profit centers. The challenge when Lehman went down was that risk and compliance officers couldn't obtain an holistic view of, for example, any and all Lehman securities, from stocks to credit default swaps (CDSs) to real estate investment trusts, that might be sitting in their own portfolios. And because, as an example, subsidiaries of European clients operating in the US were not properly mapped to the parent company, it was impossible to obtain an holistic view of any given global customer's exposure to Lehman across that same poorly organized list of assets.

The second problem was that capturing valuation data so as to calculate aggregate risk has never been a real-time requirement. Many portfolios of illiquid, hard-to-value securities or alternative investments were marked-to-the-market on a weekly or even monthly basis. There was simply no methodology to allow for interim estimation of these valuations in order to develop a real-time snapshot view of overall position risk—no internal sources, no external sources, and no timeliness.

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These two problems continue to challenge financial services firms to varying degrees today. While firms have developed methodologies to estimate hard-to-value products on an interim basis, enterprise securities and client data are still far from completely standardized and consistent across business units within global financial services firms. Until there is adoption of universal security and client identifiers—neither of which are core proprietary capabilities—this challenge will remain unaddressed.

Wood: The majority of financial institutions are still living with silo-based solutions that they started building back in the early 1990s. Many of these systems were designed and implemented to address a specific reporting requirement and lack the capacity to cope with additional new requirements that have evolved. Trying to reconcile and combine the results from these point-based silos is at best difficult and more often just not possible. Many of these systems are also impacted by the additional constraint that they work with summary and aggregated data sets. This lack of low-level granularity makes it harder to use the same set of data for two or more sets of reporting requirements. Finally, the quantity of data that would be required for very granular information inputs is truly vast. Traditional relational database systems, while able to cope with single-asset, single

business unit requirements, struggle badly when it comes to the required volumes for either cross-asset or firm-wide views.

Whitney: Lack of consistent static and reference data is a major problem. Different systems may refer to the same counterparty using different codes, which then leads to risk aggregation errors. Legal entity data is also very important in establishing exposure to a certain obligor group. Historically, banks have developed trading risk systems in product silos. The result is a great inconsistency in the analytics libraries, models and data used to price risk. Thus, another issue that banks face is managing models across the different product areas ensuring that risks are priced consistently.

Firms need to ensure that market data and transaction data used are consistent. Without this, they cannot reliably aggregate risk, and it becomes difficult to produce an audit trail from the desk to finance/risk management groups. Also, a lack of service level agreements (SLAs) between different systems, and a lack of common data interchange formats hampers integration. Some firms are tackling these problems via architectural unification exercises, but it has been slow going.

Lastly, poor user experience and data presentation within the siloed systems is being carried forward into the aggregated reporting tools. This represents a significant missed opportunity to rethink the presentation of data based on a new understanding of the marketplace and the user needs of a cross-asset system.

> "Compliance functions need to ensure that the entity is operating within the confines of relevant rules and regulations and will always be heavily driven by external factors. However, increasingly financial services firms are viewing risk management as a source of competitive advantage." **Ashley Whitney, Lab49**

Phillipson: We might highlight three challenges: The first is deciding which risks are desired and which are not, and what is the tolerable extent of any of them—and in what units and predicted over what time? The second challenge is the institutional issue of getting data from different business silos. And third, once you have done that, can the risk model help you distinguish between things that are actually sensitive to a common factor and those occasions when the same effect is seen but for asset-specific reasons?

Thomas: This is a much bigger challenge. Latency is usually not the main factor in these types of projects. The challenges reside in the ability for a firm to define the right algorithms that will not only mitigate their risk but also net their risk with deltas (options versus equities or futures), valuation of swaps, and so forth. The additional difficulty is based around the voice business versus electronic business. Firms have to take into account the voice-executed orders for processing the right exposure as well as executed orders, and unexecuted orders (sitting on a venue). The combination of everything forces firms to make compromises and most of them end up with a view of their risk exposure that is only "close to reality."

Ullink

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Lee: I think the biggest issue to this is really not technology related but instead organizational in nature. As everyone knows, most firms that pursue multi-asset-class trading operations typically work in various silos with each silo having its own profit and loss (P&L). Things also get complicated as firms acquire presence in certain asset classes by mergers and acquisitions (M&A). Once the organizational structure within these firms break down the siloed mentality, instituting a firm-wide risk exposure management would be much easier.

Heinzman: The biggest challenges are bringing together the data from the different business sleeves within a firm and creating the proper aggregation rules (linking different asset classes and product types and aggregating them to the underlying product). Credit risk, counterparty risk, liquidity risk, and operational risk are often defined and measured in different ways by different systems within the same firm. This presents a challenge in terms of understanding what the "real" risk actually is. Leveraging an enterprise technology platform like ours enables firms to bring together data, define aggregation rules, and deploy a single, normalized view of the firm's risk by ingesting and normalizing risk inputs from the various risk-monitoring systems across the firm. This approach provides a unified view of specific risks across the firm while leveraging and augmenting your existing technology stack.

> "Firms need to strike an effective balance between the twin demands of low execution latency and flexibility through risk management. The issue here is the equation of spending more money by adding a risk system and adding latency with the risk of reducing profit. It is a difficult equation to have a positive outcome. Given this equation, the challenge resides in spending the least amount of money on an efficient risk system that provides the least amount of latency." **Philippe Thomas, Ullink**

Q To what extent are compliance functions within financial services firms being driven by external factors—regulators and investors—as opposed to internal ones?

Heinzman: The impending implementation of Dodd–Frank financial reforms is causing compliance teams to spend cycles reviewing and anticipating changes. The big challenge is that the rulemaking process is stalled and there is not enough clarity on many of the provisions that will have the greatest impact. Internal pressures to meet compliance challenges with high-frequency trading requirements are causing compliance teams to address real-time and near-real-time monitoring systems. In addition, many firms are still grappling with the mega mergers that occurred during the financial crisis. Most of these firms are still in the process of combining system—both front- and back-office—and compliance departments. As back-office systems are migrated over to new platforms, compliance departments must ensure that surveillance and reporting mechanisms are also migrated and that enhanced functionalities are created to ensure adequate controls for new or more complex businesses that may have been acquired.

Lee: I would say there is a good mixture of both internal and external compliance rules dictating overall operations. It is only natural that demands of the regulators and investors drive a significant portion of the various compliance rules. However, internal capital control rules, investment restrictions, acceptable level of risk controls, and so on, are also playing essential roles in rounding out the overall firm-wide compliance framework.

Thomas: It is difficult to say. Some firms do not have any internal compliance drivers. Instead, they just want to be SEC- and Regulation NMS-compliant in order to "pass the exam."

Others have their own internal compliance and risk policy, which is based on their interpretation of the regulation and based on their own investment strategy. At Ullink, we have seen hedge funds that are looking beyond the SEC regulations by adding some complex, pre-trade filters to pass their internal compliance where other hedge funds used to be "naked."

Whitney: Compliance functions need to ensure that the entity is operating within the confines of relevant rules and regulations and will always be heavily driven by external factors. However, increasingly financial services firms are viewing risk management as a source of competitive advantage. As more products are traded on exchanges, and over-the-counter (OTC) trading becomes more industrialized, the ability to manage exposure of both flow and complex products at scale becomes critical. This is reflected both in ability to absorb risk, and hence volume, and also in overall cost-per-trade metrics when risk production is fully priced.

Laurie Berke
Tabb Group

Berke: Post-credit crisis, financial services firms were driven by one thing and one thing only: a big wake-up call that said that their risk managers and compliance officers were so far away from knowing where they were that the bottom could—and indeed did—drop out from under them. Initial responses, therefore, were driven from within these firms by the need to survive, the need to develop processes to support a near-real-time aggregate view of valuations, counterparty risk and impact on the capital viability of the firm. Enterprise data management tools and infrastructure were in the bullseye as C-level corporate heads strove to shore up their firms with the appropriate level of capital and liquidity. This meant a new level of oversight for front-line business heads who were accustomed to quarterly or even annual aggregation of data beyond their own revenue, costs, margins and net P&L. Compliance and risk were now front-of-mind for head traders and group managers needing to roll up their businesses into one firm-wide view.

Then came the regulators. Today's compliance priorities and expenditures are driven by a need to satisfy both regulatory mandates and investors' need for transparency. This means that the ability to report to the various parties of interest—shareholders, clients, boards, regulatory oversight bodies—has become the number one priority. Each of these interested parties is looking for a different "view" into the health of the financial

services firms, so once again the ability to capture firm-wide data, organize it, map it, and analyze it with a view to supporting investor and regulatory confidence is paramount. The challenge is that each of these external parties requires a different set of data, a different analysis and a different report, which requires significant expenditure on the part of every financial firm in the business today. At a time when revenue, profit and margins are thin, this expenditure is not only a significant impact on the bottom line but it is an ongoing one.

Phillipson: We see that compliance functions are mostly driven by external factors, in particular increasing regulatory change, aiming to create a more robust financial system, and to protect those deemed not able to look after themselves. The concentration on risk and regulation may be driven by regulators and an external timetable, but clients themselves, while requesting more risk information, are not imposing additional pressures on the compliance function.

> "Not being able to maintain sufficient data in-memory means there will be some risk criterion you missed, or some update that did not get to your decision chain fast enough. HFT is a non-trivial activity. Managing risk in also non-trivial and the combination of high-frequency risk management means you have to architect solutions in this environment using best-of-breed components in highly optimized ways." **Keith Wood, Sybase**

Q What technologies are available to firms trying to get as close to a real-time view of their risk exposure as possible?

Whitney: Firms are experimenting with non-traditional hardware such as graphics processing units (GPUs) and FPGAs, and there have been some notable successes. The massively parallel nature of these architectures lend themselves well to huge numbers of simulation paths, but with significant cost in terms of complexity and maintainability. The firms that have had success with these technologies already had robust systems in place, including good security data, uniform trade representations and so on. For most firms, the immediate challenge is to improve data management infrastructure. From there, leveraging existing CPU-based technologies such as complex-event processing (CEP) and distributed cache technologies can provide a very high performance solution with well understood total cost of ownership (TCO) characteristics.

Lee: I think at most firms, folks are relying on a dashboard approach to overcome the inherent issues with silos. That is, firms have implemented a high-level dashboard through which risk exposures across the various business units can be centrally rolled up so that executives can get a better sense of real-time risk exposure across the entire firm.

Wood: Working for Sybase, in a role where I actively promote the features and functions of our CEP and Risk Analytics Platform (RAP) products, it could be that I am slightly biased. Actually, it is our products that are biased. We seem to be able to consume truly vast collections of data in very short timeframes. Timeframes that our customer base tells us are vastly superior to their existing systems or those offered by other vendors. We also seem to be somewhat biased toward being able to process fairly complex queries from many concurrent users with response times that are quite frankly amazing. Our combined RAP and CEP engines allow users to implement something that is slightly akin to massive real-time spreadsheets.

Heinzman: There are a number of technology platforms available that enable firms to link together outputs from existing risk systems and provide near-real-time alerting capabilities. The biggest challenges with systems like these are not necessarily the monitoring systems themselves, but rather firms having the necessary data and infrastructure to feed these systems on an intraday basis.

Thomas: More than the view, the real-time factor is geared toward the latency of trading (accepting or rejecting orders). Several software vendors offer decent latencies to their clients through standard software: Java or C++. The cutting-edge ones are already offering FPGA technologies to reduce latency to the minimum. However, I believe that the best solution is the hybrid model where FPGA (speed) and software (GUI, flexibility) are combined. Only Ullink has demonstrated this type of hybrid model today.

Q Liquidity risk has the potential to "kill" a firm faster than any other risk challenge. How are financial institutions and third-party vendors addressing this issue?

Heinzman: Liquidity risk has been a vexing issue for many firms. The biggest challenge is for firms to be able to aggregate position data in a meaningful way. Liquidity risk can take many forms and firms are challenged to bring all of the correct data from across the firm into a single system in order to identify potential liquidity risks.

Systems such as ours are capable of monitoring and alerting for potential risks on a batch, intraday, or real-time timeframe provided the data is available in good form.

Phillipson: The first element of this is the recognition that even markets that are "always" liquid might not be. The fund managers' response has been to change some of their product designs. The risk model vendors' response has been to put more emphasis on stress testing. However, some financial institutions have just decided to make up the prices that their assets might command—particularly bonds—if taken to market. But the accountancy bodies and regulators have noticed this, which means we might see some more dangerous reality creeping into financial reporting.

Richard Phillipson
Investit

Thomas: We don't currently see, nor do we foresee, any "liquidity risk" in the equity market world, particularly, not as a threat that could "kill" a firm. Market-makers and other financial institutions still provide enough liquidity for investors to keep a tradable level of liquidity. The new market access rule should not bring potential liquidity risk.

Whitney: Firms are developing a framework for the management of liquidity risk by: including the likelihood of having to fund contingent liabilities; running scenarios looking at the impact on liquidity for events such as credit downgrades; conducting stress tests that include a market-wide strain on liquidity; contingency funding plans; management of intraday liquidity and collateral; maintaining a cushion of high-quality unencumbered liquid assets; and detailed modeling of cash-flows.

Q **Counterparty risk was traditionally an issue that only affected brokers prior to the recent market meltdown. But now it's a buy-side issue too. How is the buy side managing counterparty risk and what technologies can be implemented to assist with this challenge?**

Whitney: One of the main issues to come out of the crisis was rehypothecation of client collateral by the sell side. Lehman Brothers clients were not able to recover all of their collateral as a large chunk of it was rehypothecated to cover obligations to third parties. The buy side has reacted by looking at balance sheet strength as a core factor when choosing a prime broker. Also, business is diversified across multiple prime brokers and there are restrictions on rehypothecation of assets pledged as collateral. From a technology standpoint, the ability to be multi-prime is important. More broadly, risk management tools that allow for sophisticated aggregations, including identification of implied (synthetic) positions are useful in identifying areas of counterparty exposure.

Lee: I think most buy-side firms have reacted to the increase in concerns over counterparty risk by diversifying their counterparties and conducting periodic risk analysis with each counterparty to ensure that the risk is managed properly.

Thomas: The counterparty risk is still present despite the clearinghouses and the technology used. One would think that the most prestigious banks would have honored their contracts but the recent market meltdown shows that no one is protected from bankruptcy. More buy-side firms have decided to use multiple brokers as a strategy to mitigate their risk and be less dependent on a single firm; however, this risk is still inherent to any transaction.

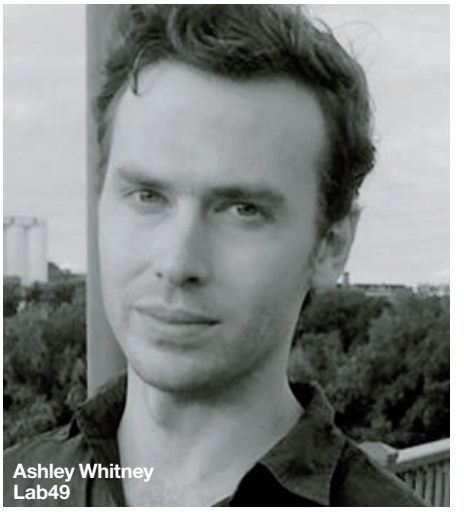
> "The concentration on risk and regulation may be driven by regulators and an external timetable, but clients themselves, while requesting more risk information, are not imposing additional pressures on the compliance function."
> **Richard Phillipson, Investit**

Heinzman: Understanding the exposure that a buy-side firm has to a particular prime broker has become an important risk to be monitored. Historically, many buy-side firms utilized only one or possibly two prime brokers; now diversification across multiple prime brokers is the norm. Also, monitoring the risks associated with a particular counterparty on a given transaction has become important for buy-side firms. The risk of entering into a transaction with a counterparty that fails has become more acute for buy-side firms. Profiling techniques that enable firms to monitor the multi-dimensional risk counterparties may present are increasingly important. It is not just credit risk that is important, but also net exposure, history of fails, and other factors that should be profiled and monitored.

Phillipson: We have not seen much change in dealing practices that are clearly a result of recent market dislocation. Most firms use Business Objects and Microsoft Excel to keep track of counterparty exposure, although there are limited package systems available to buy-side firms. Systems developed for the sell side tend to be highly complex and aimed at huge trading volumes. These reasons and the high cost of implementation are likely to deter buy-side firms from implementing these solutions. ■

Risk Management and Complex Derivatives

In a persistently challenging environment, investor demand for complex derivatives for enhancing yield and hedging remains high and is poised to intensify. As a result, such products are increasing in importance for dealers, especially with the profitability of more vanilla products shrinking due to regulatory change, the rise of inter-dealer platforms, and various other factors. By Ashley Whitney


Ashley Whitney
Lab49

Unfortunately, the changes in the market have caught some market participants unprepared. The complex derivatives market has historically been run as somewhat of a cottage industry, structured into silos with a lack of investment in technology to support sophisticated management. Desks cannot produce risk sensitivities quickly enough, often limited to a single run per day or overnight. Data warehousing and reporting solutions are not up to the task of handling more frequent updates anyway, and are only barely handling the sheer number of contracts handled at large dealers. Opaque spreadsheet applications are pervasive, and it is difficult to conduct hedging and risk management over the multiple desks cooperating on a given deal made up of diverse components.

As many dealers can attest, this situation is no longer supportable to remain competitive in current markets. Running large, complex businesses requires quality and timely risk analytics and the ability to give decision makers the right picture of the data over the many legs (and associated hedges) of a deal, the many deals, and the many participating books and desks. Achieving such goals is a significant organizational and technological problem.

Insight

For a healthy business, there is a great need for insight into what financial models are being used and what assumptions are driving those models, on individual desks and across the institution as a whole. The insight required is two-fold. Firstly, what assumptions are appropriate for a given model—e.g., curve fitting, correlations and predicted market conditions—and how are those assumptions holding up over time? And secondly, are the same models and assumptions being used throughout the firm or not, and is it even appropriate to do so? These questions are fundamental to running the business, and obviously cannot be answered magically by technology. But technology can offer significant support in regularly assessing performance and the overall aptness of methodologies being employed across the organization.

Model performance can be gauged on a rolling, daily basis by comparing projected sensitivities (greeks) with the real profit and loss (P&L) attributed to the actual sensitivities. For this to be useful, the system must capture the assumptions driving the risk model at the time of the projection, and ideally allow trader, quant and risk users to tweak parameters and re-run risk "as of" that date to assess differences relative to real P&L. To realistically achieve this, two things are necessary: The risk analytics must run fast to support real time "what if" analysis, and the reporting solutions must be intuitive and empower the user to delve into and understand the data.

Alignment

In order to support decisions being made about what models should be used for what lines of business, it is important to align around what is already going on within the organization. Catalogues of the models across the firm are often manually maintained in spreadsheets, and governed solely from an accounting point of view. These catalogues are rarely tied to the implementation of the models themselves, and fail to promote synergies between the groups and across desks. For example, two desks might both wish to use the same model to generate the Libor forward-rate curve, but may wish to use different zero-coupon curves to do so. The correct approach might enable them to share implementations, achieving faster time-to-market, simultaneously giving senior risk managers and compliance officers complete clarity into the rationale and risks of both approaches. To achieve such transparency, certain abilities should be baked into the actual implementations with organizational standards that enable sharing. Such abilities include things like automated model tracking, including versioning of functional form and assumptions. Furthermore, well-defined interfaces are needed to enable models to work together, and rigorous data modeling will make it easy to both share results and publish models as services.

Industrialization

The industrialization needed for complex derivatives desks in the near future is similar to the process vanilla flow desks have already gone through. Higher-frequency trading and tightening spreads have increased the stakes and raised the bar of the difficulty of the task and the quality of analytics required. Dealers that are able to scale up their systems before other market players stand to reap great competitive advantages. ■

Ashley Whitney is a principal consultant at Lab49, a strategy, design and technology consulting firm that creates advanced solutions for the world's leading investment banks, hedge funds, and exchanges.

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