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Traditional Practices in Financial Risk Management

Fail

the Effectiveness Test

Financial risk managers are facing the most challenging times in at least a generation. This article addresses the origins of the current crisis and suggests improvements to the mechanics and processes of risk management that have the potential to enhance its effectiveness.

BY ANDRE HOROVITZ

PRUDENTLY MANAGING RISKS is not everyone's trade these days, as evidenced by the highly publicized failures of some of the most prestigious financial institutions and the resignations of some of the most prominent banking executives of the past decade.

Given that the financial services industries and their regulators have spent vast amounts of resources in the past two decades on improving risk management and control practices,[1] one cannot help but ask the obvious questions:

- How could this global financial disaster (loss estimates connected to the subprime mortgage crisis alone now range from $500 billion to $1 trillion) have happened?
- What did risk managers miss and how could they have acted to mitigate the severe losses of their respective institutions?

Let us examine this problem by isolating risk categories as well as the risk management "effectiveness factors" relating to each: risk identification, risk quantification, information time lag, control capability, and actionability. We will examine the management of liquidity and correlation risks for market and credit risk management separately, as they warrant special attention.

Credit Risk

By far the most controversial class and indisputably the

Degree of Risk Management Precision		
Risk Class/RMEF*	Credit	Market
Risk Identification	High	High
Risk Quantification	Medium	High
Information Time Lags	Low	High
Controls Capability	Medium	High
Actionability	Low	Medium
*RMEF = Risk Management Effectiveness Factor		

main culprit of the current global financial crisis, credit risk remains difficult to tackle despite advances in modeling and management techniques.

Risk Identification

While they may seem obvious, the mechanics of credit risk instruments are quite complex. To begin with, the definition of default is not always clear or easily comprehensible to all investors. It may even vary for the same corporate entity by jurisdiction. Indeed, Basel II has established a reference definition for default, but many companies still see the default event differently, and various jurisdictions take different legal views as well.

But much of the value loss is triggered not by default itself, but rather by "perception of default," measured by migration to lower credit ratings. Here, one needs to differentiate between the ubiquitous (albeit often ineffective) agency ratings, such as Moody's, Standard & Poor's, or Fitch, and investors' internal ratings, which are opaque by nature and rely heavily on market information.

As if these factors do not seem unmanageable enough, enter market liquidity. Liquidity affects secondary-market prices by means of variations in bid-offer spreads, and it tends to behave erratically, changing abruptly based on rumors, ticker news, and emotions. Many of the late write-offs in corporate debt instruments have been attributed to the abrupt drying up of market liquidity.

And we can't leave out the pro-cyclical chain effect, which goes somewhat like this: Pension fund (or insurance company) "A" holds a corporate debt security that was just downgraded by a rating agency. The security falls out of the admissible credit range stipulated by the fund's (insurance) investment principles, and it has to be sold. Typically, it gets unloaded at a hefty discount to a bank "B" or a hedge fund "H." Purchasing bank "B" happens to hold in inventory some similar debt instruments, recently downgraded as well. Since the transaction represents a "price-finding event," the bank's accounting division (often under pressure from the internal/external auditors) demands marking this next security down by the same proportional discount, in compliance with International Financial Reporting Standards. It is easy to imagine how the chain follows until a depressed market equilibrium is reached—a process that is currently ongoing.

Last, but not least, are the "basis risks" inherent in corporate debt securities. These typically entail interest rate risk and currency risk but also amortizations and prepayment options. They typically get transferred in treasury divisions (of the large banks) and are managed on a portfolio basis. But they tend to be cumbersome to hedge against in an uncertain environment and can lead to unpleasant surprises.

The last decade's explosion in credit trading is fundamentally linked to the liquidity of credit derivatives such as credit default swaps (CDSs). The International Swaps and Derivatives Association estimates that of the total $455 trillion in notional over-the-counter (OTC) derivatives traded in 2007, $62 trillion is in CDSs of various forms. Credit derivatives are mainly used to hedge against default for certain exposures and can help banks achieve capital relief under Basel II. But lately a lot of speculators entered the markets by betting on credit migration in a capital-efficient manner, circumventing the outright purchasing of debt securities. This trend strained the CDS markets and often tainted the market information on default probabilities.

As an illustration, corporate debt spreads became increasingly volatile as a result of CDSs trading in secondary markets at speculative prices, triggering accelerated price erosion—another pro-cyclical effect. The attempt to standardize CDSs by listing them on exchanges has failed so far, owing in large part to the inner politics of bourses trying to attract volumes and dealers fearing the loss of fees. This situation makes price-finding out of OTC transactions cumbersome and often unreliable.

CDSs that appeared to be perfect hedges for banks (for example, a long position in a corporate bond coupled with a credit protection via a CDS with a broker dealer) have actually generated mark-to-market losses as their spreads widened considerably beyond the equivalents of their respective underlying bonds. These losses reflect investors' fears that dealers may not be able to make good on their contracts. The collapse of Bear Sterns is a good example. With the help of the Fed, JPMorgan Chase purchased it for a fraction of its value, after investor fears caused its counterparty lines to dry up.

Risk managers are perfectly aware of these problems, but are themselves prisoners of the market practices that so far inhibit the singling out of credit risk components in a manageable fashion.

Part of the risk managers' lapses during the current crisis was due to their concentration on ensuring adequate solvency ratios (economic capital covering potential losses often referred to as "risks" by journalists) and Tier 1 ratios for regulatory safety, while mitigating for component risks. Added to this was their heavy reliance on "portfolio

effects," typically meant to reduce risks due to diversification, but proven unreliable in crisis situations.

Risk Quantification

Probably no branch of quantitative finance improved more during the last decade than credit risk modeling. Migration and default are modeled via "jump intensity" processes often parameterized to fit implied probabilities derived from the CDS markets.

Most banks manage their credit books via "portfolio models" geared to allocate economic capital for "unexpected losses" beyond statistically acceptable thresholds. These models base their computations (either explicitly, as in the case of factor models such as Credit Metrics™, or implicitly, such as in CreditRisk+™ or CreditPortfolioView™) on assumptions for default correlations. Default correlations estimate the likelihood of two unrelated companies within a credit portfolio to default within the same period.

Modeling for correlation dynamics and for loss given default is far from an exact science and has most recently been testing the predictive powers of some of the most robust portfolio models in the industry.

It turns out that the elasticity of credit portfolio models' output to these obscure default correlations is quite high, making their accurate estimation a highly relevant exercise.

Correlations as such are statistical parameters showing how two data series "move together" against a linear relationship—such as in linear regression analyses. When heavy nonlinearity is present (together with data nonstationarity), as in the cases of corporate defaults, correlations become impractical as estimating parameters. Finance professionals reverted to the use of copulas—functions allowing for nonlinear pair-wise behavior to augment for that. Aside from the challenge of fitting the appropriate copula functions and parameterizing to the relevant data series, copulas still have difficulty exhibiting satisfactory results when defaults become "jumpy" and erratic, as in the case of residential mortgages in the U.S. over the past year.

Last but not least is the issue of recovery estimation in case of default. Most models rely on internal data. Unfortunately, recent experiences show that every default cycle seems to carry new sets of surprises that fall outside the datasets of most institutions. The recent deterioration in collateral values on a national scale and the new dynamics for real estate secondary markets illustrate that last statement.

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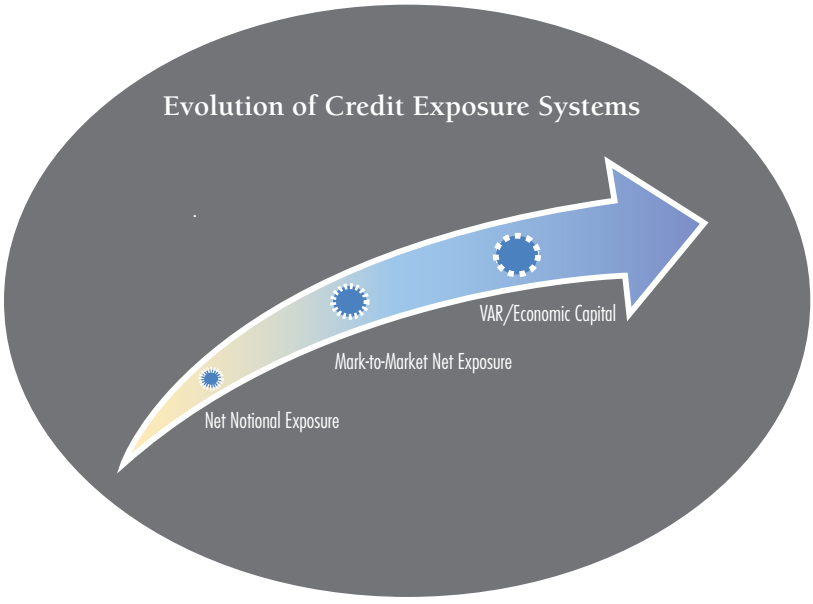
Information Time Lags

Much of the input in credit models—not least the credit-scoring models, which measure the creditworthiness of borrowers—rests on historical data. Balance sheets, income statements, statements of cash flows and liquidity, and even analyst reports are processed by credit-scoring "crunchers" with the aim of developing a robust credit score. The idea is to differentiate between solvent and insolvent borrowers over the loan horizon.

Recent financial statements come with inherent delays, especially the audited ones, so it's not surprising that the most recent relevant information tends to be neglected in the processing efforts.

Analysts try to augment this inefficiency by entering implied information derived from recent market data, such as traded credit spreads, implied spreads from CDSs, and so on. But as we have seen, a lot of noise driven by emotional factors can create inaccuracies in the data, confusing the entire credit analysis process.

Arguably, neglecting recent data for its tendency to introduce inaccuracies is worse than embracing it wholeheartedly. Nevertheless, the output is often tainted by these "dirty inputs," which result in imperfect credit scores.



Control Capability

Most banks, while still struggling with the buildup and maintenance of near time-capable exposure management systems, are now equipped with sufficient management controls to monitor credit exposure and the use of limits. While the sophistication of exposure monitoring varies among peers, credit managers seem generally better equipped to identify special credit exposures in a timely manner than they were a decade ago. During the weekend after the announcement of Barings Bank's collapse in 1994, the parking lots in the City of London and lower Manhattan were unusually crowded as entire departments put in long hours of work scrambling to identify their firms' respective exposures. This kind of "brute force" effort was eventually replaced by more automated processes—modern systems for managing limits and exposure that relied on relational databases.

Yet again, the devil is mainly in the details. It is not the ability to identify the level of exposure to a given counterparty (or set of counterparties) that causes managers the big headaches. Rather, it's the ability to put a value (or, more specifically, a replacement value) on the critical exposures.

In the absence of sufficient market liquidity, this exercise becomes difficult at best—which brings us to the last critical point of our analysis: actionability.

Actionability

Actionability is perhaps the criterion of highest impact/controversy in current disputes on the risk management issue. The risk oversight profession has evolved and is still in the process of evolution. Risk managers find themselves the equal partners of business decision makers at the management helms of most banking institutions. Indeed, chief risk officers are mostly mandated to make business-independent decisions concerning their institutions' risk exposures and to allocate economic capital congruent with the firms' risk/return profiles.

Yet, by and large, it is precisely this view of the risk profession that has limited its effectiveness during the current crisis. Allocating economic capital and ensuring bank solvency under a statistically acceptable threshold are by no means active management concepts.

As seen from the business side, the value added of risk managers rests mainly with their ability to leverage their skills toward proposing capital-efficient structures for deployment of capital, such as in the cases of portfolio securitizations, off-balance-sheet structures (such as conduits or SIVs), and so on.

Most banks—some even with the most advanced risk management practices—work under a culture of segregated responsibilities. Risk managers are responsible for developing and validating rating methods, for assessing related risks, and for establishing limits in conformity with risk tolerance levels, bounded by economic and regulatory capital constraints. Once these limits are fixed and clearly communicated to the business units, the risk managers' involvement tends to cease (at least until the client's management is transferred to the recovery division, which in most advanced-practice institutions is typically within the CRO's responsibility). It is therefore no surprise that risk managers typically come into the game rather late and have few if any options to act upon.

Perhaps a more effective credit-processing model could enhance the symbiosis between the risk manager and the trader/customer officer.

Perhaps a more effective credit-processing model could enhance the symbiosis between the risk manager and the trader/customer officer. Such a model could entail an ex ante contribution of the risk manager by assessing the marginal and incremental credit value-at-risk (VaR) on both a stand-alone and portfolio basis. While capital allocation ought to be based on a portfolio basis (as stipulated by the Basel Accord and by industry best practices), individual credit decisions are better taken on the basis of an individual credit, at the expense of complicating the reconciliation to the portfolio's overall VaR.

To achieve this, the credit risk manager needs to be involved in the deal from the beginning to the end, a practice still foreign to many institutions.

Market Risk[2]

Risk Identification

Most banks operate sound and robust internal market risk models capable of assessing VaR positions and even linking them to the position's risk factors. Whether sensitivity based or simulations driven, most models are by now sufficiently accurate for their use in capital adequacy and limits monitoring. Likewise, limits management procedures are typically advanced and well organized, given that they are usually well scrutinized by regulators and auditors and are an important input to the model's capital multipliers. In other words, banks take them seriously.

Banks tend to monitor treasury risk exposure by means of re-pricing and liquidity gaps, geared to limit swings in accounting P&L, along with monitoring the potential economic losses estimated by market VaR.

Yet again, some scrutiny of the details points to some problematic areas meriting attention.

As in the case of credit instruments, the valuation of market risk instruments like stocks, bonds, and their derivatives hinges on accurate estimates of parameters,

such as volatilities, expected dividends, and implied term structures of interest rates and credit spreads. These are typically derived from the existing prices of traded instruments, either on exchanges or OTC.

At Nagler & Company, which specializes in market data management for trading floor support, we have seen no single recipe, let alone a set of standards for dealing with market data. Every firm (and occasionally various divisions within the same firm) champions its own proprietary means of cleaning and deriving requisite valuation parameters. The weightings assigned to historical volatilities and their "smile structures" (in and out of the moneyness), estimates of implied or forecasted dividends, or even convexity adjustments for futures versus forward contracts are markedly different from one firm to the other.

In many instances, analysts make no adjustments for the extra counterparty risk exhibited in OTC contracts versus the exchange-traded ones, as they derive implied volatilities. Similarly, many derivatives rooms still work with flat term structures of spreads and, in their efforts to capture market data, neglect correlation effects between spreads and term structures of interest rates. These factors, especially in stressed market situations, can make significant differences in valuations—and, more importantly, in scenarios developed for risk assessment purposes by means of valuations.

Last but not least, as in the case of credit, special emphasis is due liquidity and correlation. Heavily nonlinear and nonstationary in nature, liquidity and correlation tend to behave in "regimes" of high or low values and are subject to erratic and unpredictable jumps. The values of certain products (constant-maturity swaps, for example) rely on estimates of correlations, and the price sensitivity to them, especially during volatile trading regimes, is remarkably high—making hedging a complicated endeavor as well.

The reconciliation of trades between the general ledger, the mid-office, and the front-office systems remains a major challenge to some of the world's most advanced capital markets players.

A convergence to industry-wide accepted standards—led by industry working groups (such as the International Accounting Standards Board)—could help enhance the effectiveness of risk management for most firms.

Risk Quantification

The challenges of risk quantification lie in the difficulties in assessing product valuations under "tail end" scenarios. Goldman Sachs reported that the unexpected high losses in two of their hedge funds active in mortgage derivatives last summer resulted from "twenty sigma events"—suggesting events with an occurrence likelihood of lower than once every 100 years.

A few applications of *extreme value theory* (EVT) concepts—by now standard tools for stress-testing complex portfolios of financial instruments under tail-end scenarios—suggest a possible de-coupling of valuation models between normal trading regimes and stress regimes. The prevailing industry standards (used also by internal and external auditing professionals) hinge upon a unifying valuation approach: A formula should hold for all trading regimes for the same class of instruments.

We dare to suggest revisiting this paradigm in the light of painful lessons learned in the last year (particularly under stressed liquidity and correlation regimes) and exploring a multi-regime valuation approach to financial securities. This concept can be expanded to the calculation of re-pricing and liquidity gaps for asset/liability management purposes. Contractual re-pricings of respective maturities can be replaced by "stressed" values, as long as the scenarios are economically viable and well understood within the organization.

Information Time Lags

Unlike with credit products, market information tends to be readily available, and professional market participants have easy access to it. Professional market data specialists like Reuters, Bloomberg, and Markit have created respected standards and provide very good data deliveries to institutions around the world.

The data problems arising from distribution were addressed here under the section Risk Identification, but in general are not flawed by timing inadequacies.

Control Capability

Most known failures of market risk systems are traceable to inadequate capture of positions and/or dealings with "cancel and correct" entries. Société Générale's alarming loss report in this year´s first quarter stands as supporting evidence for this statement.

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Despite regulatory pressures—such as the European Union's new Markets in Financial Instruments Directive (MiFID) spearheading best-execution standards on behalf of customers, or the minimum requirements for risk management (MARISK) in Germany—banks are still far from having achieved acceptable standards in this area.

The tightening of processes around positions and trade controls is of paramount importance when analyzed from

the angle of risk oversight effectiveness, and many banks need to pursue further investment in this area.

Actionability

As in credit operations, trading floors have been managed for a long time under a philosophy of separate responsibilities. Traders are in charge of taking risks under limits that are set and monitored by risk managers (often called "risk controllers").

The same culture of segregation has been the typical standard on many trading floors, but admittedly it is changing for the better in more progressive institutions, and traders and risk managers are cohabiting more harmoniously.

Recent developments in risk assessment techniques have led to a distinct separation of skills. Traders have undisputed supremacy in analyzing market and product behavior under normal trading regimes, and the risk professionals tend to deploy special analytical skills (to, say, the "tail end" events) that are foreign to most traders.

A match between the two has so far been difficult to find, both in cultural and, consequently, in organizational terms. But as events tend to link these regimes and contribute to significant P&L variations (see events at Citibank, Merrill Lynch, West LB, and others), the new trading managers are forcing a more cooperative attitude, which we expect to yield better results. Risk managers should not "just" deliver and manage risk limits, but ought to be consulted in specific cases ex positioning. Anecdotal evidence shows that those trading operations run under such regimes (Goldman Sachs, JPMorgan Chase, and Deutsche Bank, for example) tended to weather better the financial storms of the past months.

Conclusions

Despite the remarkable advances of the last 10 to fifteen years and billions of dollars invested in technology, the financial risk management profession has more or less failed the critical effectiveness tests imposed by the recent—and by no means concluded—financial crisis.

To enhance efficacy and effectiveness, market participants have at hand a number of corrective actions that hopefully can be favorably reviewed by regulators and bank supervisors.

There is a need to achieve industry-wide standards for capturing implied market parameters to serve as requisite inputs to the product valuation models.

Specifically, industry working groups ought to agree on common standards for dealing with liquidity and correlations (within risk factors) and employ a best-practice approach to be supervised by bank regulators.

The industry should also consider a new paradigm allowing for de-coupling valuation engines of complex financial products, differentiating between "normal" and "tail end" trading regimes.

Modern financial institutions need to adopt a more symbiotic culture of cooperation between risk management professionals and trading/business unit professionals, striving to enhance complementarity while safeguarding independence. In some institutions, a cultural breakthrough is in the works, but perhaps current events can help catalyze the industry toward organizational forms that are better suited to developing this cooperation.

Risk managers need to take a more path-dependent, proactive stance on managing risks as events and business conditions evolve.

Last but not least, this is a good time to call on the regulatory authorities to complement their concern for capital solvency with a more "path dependent" view as a way to safeguard the industry from systemic risks. The recent downfall of Bear Stearns (apparently with over $20 billion in liquidity reserves and with a sufficient economic capital cushion) should trigger some further thoughts in this direction.

At the same time, risk managers need to take a more path-dependent, proactive stance on managing risks as events and business conditions evolve, as opposed to concentrating solely on safeguarding Tier 1 and economic capital ratios, even under stress scenarios. ❖

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The opinions expressed in this article are strictly the author´s and are not necessarily shared by Nagler & Company.

Notes

1 The numbers vary from one estimate to another, but investments in financial risk measurement, management, control, and governance in OECD banks, measured in billions of dollars per year, have grown steadily over the past two decades. Regulation has evolved in an attempt to enhance transparency and accountability for taking risks, culminating in a convoluted framework that sets minimal standards for capital adequacy, risk management practices, and disclosure. The most prominent of these is the Basel II Accord.

2 The following discussion on market risk applies only to trading-market risk, not to asset/liability management concerns.

Letters to the Editor

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