Meeting the Challenge of Economic Capital Implementation

Data fragmentation and model implementation are major technical obstacles to the success of economic capital. Both must be addressed if capital calculations are to be more than a costly but necessary exercise in regulatory compliance. In discussing approaches to meeting these challenges, David Rowe and Dean Jovic stress that flexibility and transparency are key to success.

by David M. Rowe and Dean Jovic

Risk is fundamentally a portfolio concept. Folk wisdom has recognized this for centuries with aphorisms such as "Don't put all your eggs in one basket." Nevertheless, rigorous analysis of risk in the financial markets is little more than 50 years old, dating back to the early working papers of Harry Markowitz in 1952. And as is so often the case, there was a considerable lag between theory development and practice application. Only the introduction of minicomputers in the 1970s brought the concept of market betas and effective measurement of portfolio diversification and risk within practical reach of equity investment managers.

In the banking sector, the elevation of risk to co-equal status with expected return as a management priority has been even slower. Arguably, this began with the development of risk-adjusted return on capital (RAROC) at Bankers Trust in the 1980s and only became widely practiced starting in the mid-1990s. Compared to buy-side investment managers, banks face greater technical obstacles to a rigorous treatment of risk. The most important of these obstacles are:

- A wider variety of *products* with more varied sources of potential losses—an analytical challenge to developing 1) risk estimation techniques appropriate to each product and 2) a rigorous means of aggregating these risks.
- A legacy of *fragmented data* across multiple systems. This is the downside of computer power migrating from one or two mainframes, to dozens of minicomputers, to thousands of PCs over the past 30 years. Significant staff time and technology must be expended to gather relevant data reliably on a continuing basis. Tools for this task must permit business analysts—rather than computer programmers—to maintain the translation definitions from source systems to central built-for-purpose data marts.
- A continuously shifting regulatory and analytical landscape that demands calculation tools with maximum flexibility and a high level of transparency. Uncertainty around the specific details of regulatory capital calculations and the distinctly work-in-progress nature of relevant analytical techniques make significant future extensions and revisions to the models a certainty. This implies that flexibility and transparency are essential characteristics of the associated modeling environment to accommodate these inevitable changes.

Alternate Data-Integration Strategies

Three broadly defined strategies for internal data exchange are relevant.

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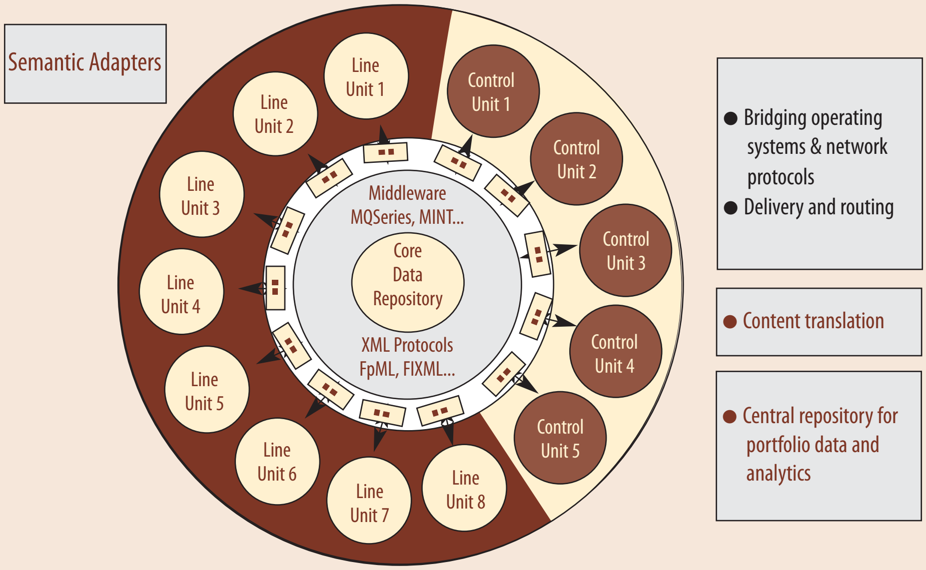
Figure 1

The "Ideal" Approach



The default solution. Typically, internal data transfers have been implemented at various times in response to specific needs as they arose. The result is a hodgepodge of point-to-point data feeds designed by different developers at different times to meet different needs. Such bilateral data links are often the fastest and easiest way to solve an immediate problem. The downside is that there is no consistency in the format, and the logic to create recurring data files is usually unique to each instance. In the end, maintaining such data feeds becomes a major cost burden. Also, this approach is typically batch oriented and not easily extended to meet real-time update requirements. Absent central coordination, organizations tend to adopt this ad hoc approach on a piecemeal basis.

An "ideal" approach. This approach is illustrated in Figure 1. The disorganized snarl of point-to-point connections is replaced with a corporate information backbone. Three broad functions need to be implemented for this approach to be successful.

1. Disparate operating systems and network protocols must be bridged, and information that is transmitted must be properly routed and received by the appropriate recipients. This is the task of standard middleware products, such as MQSeries from IBM and MINT from SunGard.
2. A more troublesome requirement is content translation. First, this demands well-defined XML-based mark-up languages, such as the Financial products Mark-up Language (FpML) and the Financial Information eXchange Mark-up Language (FIXML). Second, it demands a series of adapters to translate content between the individual local systems and the standard XML-based mark-up language.
3. Core data must be consolidated in multiple, built-for-purpose data marts for ease of analysis and assured archiving in a consistent format.

Despite many advantages, adoption of this approach has been slow for a variety of reasons. First, the industry standard mark-up languages have been slow to develop. This has left many institutions reluctant to forge ahead on their own, knowing they will have to make major revisions when an industry standard is established. Second, the process of developing the adapters is a significant investment, and these would have to be modified if the structure of the core mark-up language is revised. Finally, the payoff from these investments tends to be broadly distributed across the organization rather than accruing mainly to the business units that develop them, which discourages piecemeal adoption of the approach.

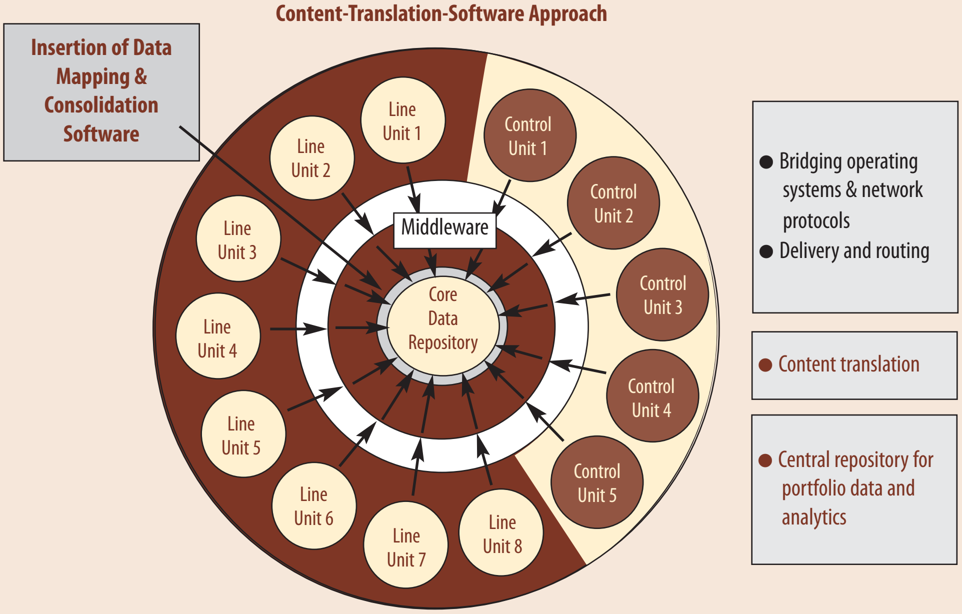
A practical alternative. There is a practical middle ground between point-to-point file transfers and an ideal self-describing messaging environment. This involves inserting a layer of content translation software between the local systems and the central data repository. Figure 2 illustrates this approach.

The software layer plays a dual role:

1. It provides a visual data-mapping environment that can be used by business analysts who do not have to be

Figure 2

Content-Translation-Software Approach



programmers. It allows users to define the appropriate correspondence between fields in the remote database (or flat file output from the remote system) and the central data repository. Having defined these relationships, the software creates a standard translation file to preserve this correspondence.

2. It performs periodic transformations and transfers of actual data from the local systems to the central database, using the meta data in the translation files created and maintained by business analysts.

Compared to point-to-point links, the content-translation-software approach introduces much greater discipline and consistency in mapping data in the remote systems to their counterparts in one or more central data marts. Moreover, changes in the local data formats can be spotted relatively easily and the resulting problems corrected in a timely manner. This ability can be strengthened by defining "sanity checks" on the values of inputs as part of the meta data in the correspondence table. This often can allow issues to be recognized in the translation process, even if the local change has not been communicated to those in charge of the central data consolidation.

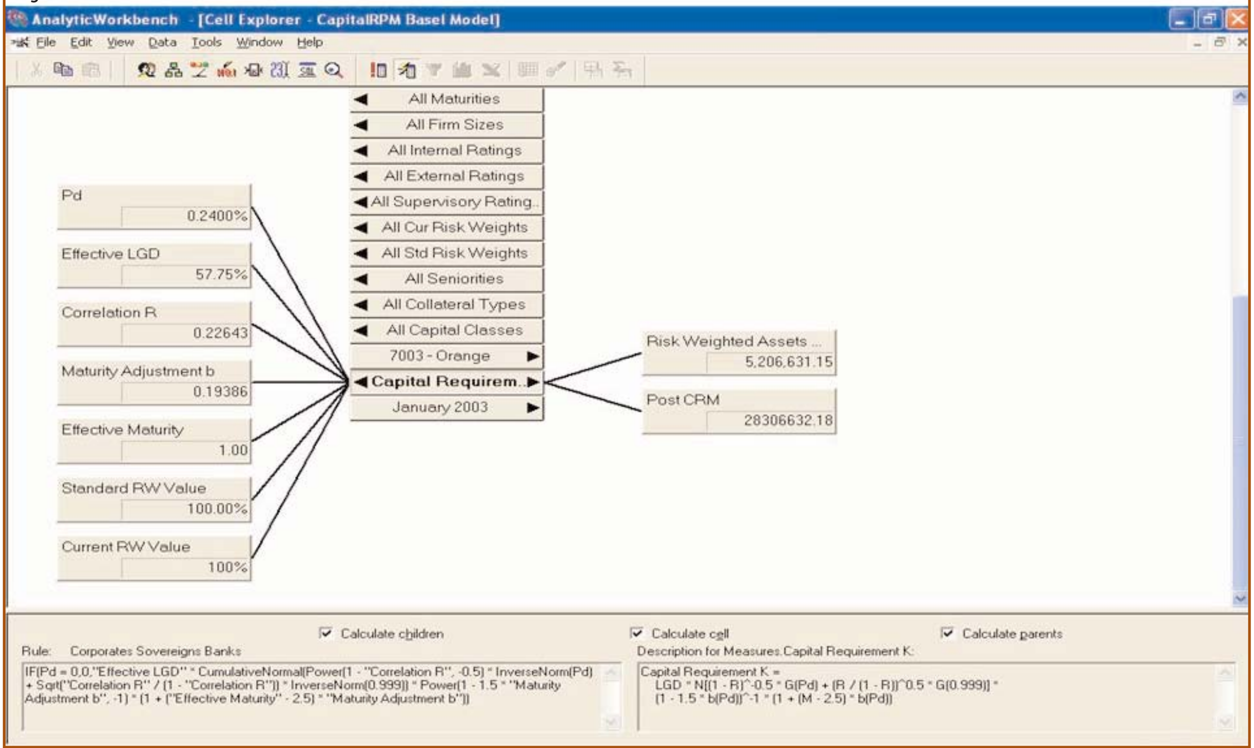
Obviously, an approach to data consolidation based on translation software does not create virtual many-to-many interoperability, which is the ultimate goal of the ideal system. Nevertheless, it greatly streamlines the process of creating and maintaining central repositories of data needed to perform meaningful enterprise-wide risk analysis. As such, it should be seriously considered as an option for any organization struggling with the data consolidation and analysis requirements of both regulatory and economic capital calculations.

Characteristics of an Appropriate Modeling Platform

When we turn to the question of a platform for implementing risk estimation and capital allocation models, similar issues of flexibility and transparency arise. The Basel II capital calculation involves a relatively small set of base calculations, but the way they are applied and modified depends on the particular combination of approaches, rating classifications, associated collateral, and availability and nature of guarantees—all compounded by local variations in the rules. As a result, one important type of flexibility is the ability to apply multiple variants of the same basic formulas in a context-sensitive manner. Furthermore, the user should be able to modify formulas at will (e.g., to model proposed changes in regulation), yet keep a secure "locked down" version for external reporting.

To calculate regulatory capital, compare and benchmark the results against economic capital amounts, and perform credit risk analysis, financial institutions need sophisticated modeling and analysis capabilities. In addition, an appropriate system must be able to handle stress testing (including multidimensional what-if analysis) and reporting for market disclosure. As the exact regulatory requirements for stress testing are not yet defined within Basel II, flexibility is again an essential requirement. Any number of stress tests performed on any factor in the model should be supported. This functionality includes the generation of Monte Carlo simulations based on a variety of distributions (Poisson, Beta, Gamma, Weibull, etc.), the calcu-

Figure 3



lation of extreme-loss estimates with any user-defined confidence interval, and the ability, through "extenders," to access external models and calculations. Ideally, in-house models for calculation of default probabilities, exposure at default, and loss given default can be implemented on the same platform.

Basel's Pillar 3 requirements mandate the regular publication of detailed disclosures covering all relevant portfolios within the bank, broken down in multiple ways and including qualitative information and quantitative data. An appropriate system must provide a full audit trail for published disclosures. Thus, the system should facilitate drill-down functionalities to trace the origin of, and inputs to, all credit risk calculations. Figure 3 illustrates one approach to providing this functionality. The bottom portion of the screen shows the structure of the formula being applied. By clicking on the cell with the result, the values of all the inputs for each variable in the formula are displayed. This allows easy tracking of problems and provides a high level of transparency for auditors and regulators.

Finally, in order to satisfy internal reporting needs and disclosure requirements, the system should allow defined users to publish common reports, alerts, and scenarios. These features facilitate "risk awareness" in the day-to-day running of the business and address key requirements of the "use test" under Basel II.

Conclusions

Essentially, we believe that the final form of the Basel Capital Accord is not the core implementation issue; rather, it's the ability to have an institution's data well organized and centrally accessible and to perform *and document* the necessary calculations. We also believe that addressing the data issue properly will allow banks to leverage their Basel II efforts to improve their fundamental risk management processes and not just pour money into regulatory compliance alone.

Solving the integrated risk and capital management puzzle inevitably will be linked to the unique core competence of a bank to manage its risk portfolios more effectively than competitors. Thus, developing an advanced risk management practice and an economic capital framework is key to gaining competitive advantage from Basel II compliance efforts. ❐

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