Steps to successful credit risk monitoring in capital services

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Introduction

With credit risk management, Algorithmics, an IBM Company's experience is that while many capital market firms have very good systems to address their immediate needs of 'right now', a surprising number need to improve when dealing with their future needs of 'this day', 'this week', or 'this month'. The widespread presence of powerful trading systems that provide complex exposure calculations has meant that organizations are generally very good at calculating risk, and rogue traders have focused organizations on sophisticated intra-day risk monitoring. However, when these organizations were asked more fundamental questions, such as:

- What is my company-wide exposure for a specific counterparty?
- How quickly would I learn of breaches of my overall prudential limits, such as country, currency or trading product?
- Does everyone in the organization view the same credit risk data? Is it consistent between operational, regulatory, management and risk reporting?
- Do I have processes for credit approval that are consistently followed and provide sufficient management visibility?

Responses consistently ranged from "Not sure" to "No".

The cause

The reason is that gathering virtually all the differing risks across a trading organization requires a considerable effort. Trading systems are typically highly specialized, and a trading organization may have a number of separate systems, each with its own set of counterparties and counterparty exposure calculations and risk. There may be separate systems based upon the financial instruments that are being traded, whether currency derivatives, commodity futures, equity derivatives, or other instruments.

Many capital market firms have a number of organizational components: some by location (London vs. Singapore vs. New York), some by function (proprietary trading, trading for customer account, divisions by type of customer that is focused on), and some by type of instrument traded. Once again, counterparty exposure information may be divided between the systems that support each one of these separate parts of the organization.

Finally, collateral and their valuations often reside in systems that are different than those tracking the capital markets exposures they support. Producing a combined view of the current collateral valuations with the current exposures is sometimes quite difficult. Similarly, ISDA agreements can add an additional item of complexity. Ensuring that the netting in those agreements is properly applied is necessary to ensure a proper calculation of risk.

Unless efforts are made to consolidate this information institution-wide, it can be extremely difficult to understand the current state of a counterparty's credit, or to quickly react when there is a potential issue.

The solution

With over 15 years of global experience building solutions to these problems in numerous implementations, Algorithmics has developed the following 7 steps for organizations that want to provide a consolidated picture of credit.

Step #1: Deploy a data repository for virtually all credit risk data

Whether it is called a data warehouse, a "data mart", or simply a database, this is where nearly every project has to start – and where many (unfortunately) end. It is not unusual for a financial institution to spend a year or more determining which data should go into the repository, and how it should be organized. A typical repository has dozens of tables and thousands of data items, including, at a minimum, customers, customer groups, traded products, exposure, and collateral. Financial institutions may also choose to include information such as netting agreements, external and internal risk ratings, regulatory and economic capital impact, CVA calculations, etc.. The data repository has the challenging task of serving multiple, diverse stakeholders in the organization, each of whom may have different goals and ideas about what should be captured.

Stakeholders also have the added challenge of answering other key strategic questions about their credit risk data. Is this a system of record for regulatory reporting? Will historical data be stored? If so, can that data be restated, such as for month-end and quarter-end adjustments? If historical data is restated, must the original and the change be kept? Will the repository also contain projections of future exposure, such as proposed credit lines and projected future credit usage? Will the data storage contain multiples of these forecasts (6 and 12 months into the future), as some financial institutions have required?

Designing a repository this complex requires a careful balance between capturing too little data – and not serving the financial institution's needs; or capturing too much – and potentially never finishing the project. The length of design time involved can create its own issues. During the year or more of design time, business needs can change, which can cause more design changes, naturally causing more delays. Receiving sign-off on a final design can be particularly difficult, since each stakeholder knows that they now have a solid commitment that can not be changed, yet they are expected to perform in a business environment that has fluctuating needs. Without strong senior management involvement and direction, this data design is a process that may never end.

Step #2: Stratify data and calculate key risk and capital measures

Consolidating the raw data into a single repository is just the first step in creating useable information. Following consolidation, multiple risk measures then need to be calculated along scores of axes. Many financial institutions require calculations that are based upon Basel, country-specific, and internal bases. Each calculation can require a different formula, and frequently includes different

approaches to applying collateral. In addition, there is often a desire to calculate regulatory capital requirements. These calculated risk measures then need to be stratified and summarized based on business requirements, again from multiple stakeholders. Each of the risk measures needs to be calculated at various levels of the intersection of the financial institution (e.g., branch, department, country, subsidiary, legal entity, parent), the counterparty organization (e.g., branch, company, company group, country, sector), and the risk instrument (e.g., currency, financial product type, maturity, contract).

For a typical financial institution, these intersection (or consolidation) points can easily number in the millions. Efficiently organizing the data and performing the calculations, in a way that is practical to execute on a nightly basis, can be technically challenging.

Step #3: Implement risk monitoring applications

Trading systems generally support counterparty limits monitoring for the products and locations that they are being traded in. However, the systems and organizational silos that many firms have implemented to meet their diverse needs as previously described, has meant that those limits are typically quite fragmented. Furthermore, without an institution-wide view of risk, prudential limits that span counterparties such as for counterparty groupings, countries, currencies, and sectors are almost impossible to implement.

Organization-wide limits monitoring is just the beginning of good credit risk practices. Understanding the transitions in risk for counterparties and areas of prudential liability may even be more important. Reacting more quickly when a counterparty (or country) is downgraded to reassess risk and limits is incredibly important in today's dynamic and interconnected environment. Additionally, performing the same reassessment when upgrades occur may be equally important to help ensure that deals are not lost and opportunity costs are not incurred. Basic processes such as regular financial evaluations for those counterparties who may not be publicly rated are also essential.

In order to achieve these best practices in credit risk management at the enterprise level, risk monitoring applications should be adopted to address both limits monitoring and risk management processes.

Limits

Credit limit monitoring confirms that credit risk remains within approved credit lines. Exceptions occur when exposure exceeds a given threshold of the approved credit line. They may also occur if the tenor of a deal extends past the tenor of the approved limit. While such exceptions may be noted in a report, oftentimes the financial institution desires notification through a workflow, so that a response, review and if necessary, escalation can occur in an environment that is controlled and documented.

However, credit limits are not just about counterparty risk; they typically involve counterparty groups, including both legal structures, as well as those built by interlocking boards and family groups. These latter groups are particularly important when considering concentration risk. Limits are also set on industry and economic sectors, as well as for currency and country risk.

Due to all of these factors, it should come as no surprise that limits can become complex. Counterparty limits may be set at multiple levels in the counterparty hierarchy, including branch, subsidiary and parent, while some may be specific to a traded product. Limits may be fixed or set as a dynamic number, such as one based on the percentage of total exposure of the financial institution. The limits may also be set against separate risk measures, for example pre-settlement and settlement risk.

Limits are typically established according to a set of consecutive time bands, where each time band is defined as an offset from period and offset to period relative to the current business date. There should be no limit to either the number of time bands that may be included in the limit or the granularity of each time band itself. Limit values for subsequent time bands can be set as fixed values or as a

percentage of the limit for the first time band. The actual dates and exposures corresponding to each time band needs to be automatically revised each business day to take account of the shift in time bands relative to the transactions' dates.

Additionally, buffer and tenor limits need to be supported. Buffer limits allow separate notification thresholds to be set as a percentage of the "base" limit, which helps enable early warning against limits nearing their full capacity. Tenor limits allow checking to be applied against a limited allowable transaction tenor rather than against the limit value.

Processes

There are typically a number of credit management processes that should be performed based on both regulatory and policy requirements (for instance, the periodic recalculation of credit ratings, and review of financial information). In addition, reviews may be required when public ratings agencies change their ratings, especially in the case of a downgrade of a counterparty, or where financial turmoil occurs in a country where the counterparty is located.

Credit risk monitoring solutions should calculate when the next review is due per customer, over and above alerting business and credit divisions of virtually any upcoming reviews due, or reviews that are past due. Trigger events, such as downgrades, should automatically generate notification and begin the associated workflow. The solution should also have automated processes for providing submissions and their approval processes.

Another critical credit process is managing excesses. Excesses are the credit corollary to overdrafts in that they exist when a counterparty has exceeded their credit limit. Credit managers need to be able to review excesses generated by the limits system and sign-off on them. Typically, these approvals need to be performed at various levels, allowing credit managers to administrate excesses of their counterparty portfolio on a micro level and risk managers to sign off excesses on a portfolio level.

Step #4: Provide online viewing with appropriate security capabilities

In the typical financial institution there are front office sales systems, middle office supervision systems, back office processing systems, risk management systems, regulatory management systems, management systems, and more, where each group of users has a separate system with a separate user interface, with individuals frequently viewing data from differing sources.

In this environment, it is difficult to have the entire institution working together to limit risk. Due to the nature of separate systems and sources, it is too easy for one group to lack access to information that could provide insight into potential issues, and it is difficult to coordinate workflow processes across the organization.

One of the best solutions is to grant credit users online access to the same information from the same source. However, that usage needs to be properly restricted so that users can only see the data that they have rights to see. Many financial institutions may only allow data to be viewed through reports to a small subset of the organization, which helps reduce the accessibility and the immediacy of the information. That said, such restrictions may provide the easiest data privacy control for many organizations. Algorithmics' experience has demonstrated that providing an online portal is necessary to provide exposure and risk information to the widest possible audience. However, the development effort for this faces the great challenge of the complex security capabilities that need to be provided.

Normally, the security function needs to offer a configurable method to provide both data and functional permissions. Data access permissions grant users the right to access specific data. When the financial institution defines data access permissions, they actively grant users or user groups access to specific data, such as counterparties, facilities, limits, credit mitigants, and credit applications. They also grant rights as to the data modification, typically as read-only, update, and delete.

Functional permissions grant users access to menu items, tabs on detail screens, and buttons. Financial institutions usually require customization by user or user group regarding the content of the menus and tasks based on what the users are allowed to see and do. For example, many of the credit processes (or their specific steps) may only be performed by users specifically authorized to do so.

The complexity of the security model can be demonstrated by a real world example. One of Algorithmics' Asian clients has a single customer who is provided credit facilities in three different countries. Within those countries, there are specialists who focus on specific types of lending. Thus, the privacy policy requires that persons need only be able to see those credit facilities for this single customer that are issued in their respective country, line of business, and where they are the designated account manager. If that single customer also happens to be a customer of the private wealth management division, there may be additional restrictions depending on company policy in each country. In addition, certain data items for a specific customer may only be visible, or maintainable by a subset of the persons authorized to generally see the data. Building an in-house solution to support this complexity can be difficult and time-consuming.

Step #5: Reporting database and reporting solution

As with online data, in many financial institutions there are front office reports, middle office reports, back office reports, risk management reports, regulatory management reports, management reports systems, and more, where each group of users has a separate reporting system, frequently viewing similar data from separate sources, with similar numbers calculated in differing ways.

Best practices, regulations, and Algorithmics' experience confirms that using a single source of data for reporting can provide enormous benefit to the financial institution. However, the first step of creating a data repository as previously discussed is rarely the optimal source for reporting. The data repository is typically designed in a way that eases the collection, stratification, calculation, and viewing of daily information, whereas the reporting database should be designed to facilitate high performance reporting and the storage of historical information for comparison purposes. These two different design goals cannot be reasonably met with the same database design.

Unfortunately, the creation of a reporting database can become another bottleneck when implementing a credit risk monitoring solution. Frequently, creating this database is thought of as a straightforward technical task – taking the data requirements based on the data repository and reorganizing that data in a way that is optimal for reporting. However, the design of this database becomes much more complex than that – and is driven by the requirements of the financial institution. The need to help optimize competing users' report performance and the desire to institutionalize standard calculations in the database can lead to extensive requirements analysis, reviews, and signoffs.

The number and breadth of reports can also be substantial. It is not unusual to have hundreds of reports that need to be produced. Additionally, these reports need to provide visibility on virtually all key measures within the credit universe, and support the analysis of capital and profitability for the existing and proposed portfolio, based on current conditions or under user-specified stress assumptions (e.g., for PDs, LGDs, correlations, etc.). The ability to analyze the effect of increasing lending to various borrowers, sectors, or countries at an enterprise level needs to also be supported. Reports need to also provide the ability to analyze the performance and workload.

Step #6: Gather data from across the organization into the repository

Integrating with each of the systems of record for customers, exposures, collateral, credit ratings, etc., can be a very significant task. On average, these integrations are performed once a day. Some data may be best refreshed each night, such as with exposures, whereas some data may be best updated on a net change basis, such as for counterparties, and individual circumstances can determine one of the best courses of action. In many cases, data integration is one area that may get over-designed. There is a natural tendency to design these integrations with sophisticated service oriented architecture (SOA) or enterprise integration architecture (EIA) approaches. However, due to the volumes of data involved, and the typical lack of need for real-time processing, straightforward batch extract, transform, load (ETL) architecture approaches are frequently the more practical and efficient.

Given the quantity of sources that may be needed for this step, Algorithmics has found that taking a phased approach here is more realistic. Providing some of the data sooner rather than delaying access until the data is available is a more efficient methodology. The typical need for significant data cleansing in step #7 means that the sooner the data is visible, the sooner it can start to improve.

Step #7: Continuously cleanse data

The term "garbage in, garbage out" has been broadly used in various capacities. When it comes to credit risk monitoring, it may be more useful to think of data in terms of cleaning. In cleaning a house, complete visibility of all debris is the first step towards clarity. Data is no different. Online and reporting access to data means that more people will see it – and gain the opportunity to realize if it is right or wrong. At first, users may not trust the data because of the visibility of its flaws. While access to the data can certainly be appreciated, it may not be used due to a lack of trust unless the data is more quickly cleansed. At least initially, the dedicated effort of a focused team can be required to cleanse the data well enough so that it can be shown across the organization. This team needs to get the quality of data to a level of usability that inspires use, especially amongst the front office (e.g., relationship managers). Incentives and tools then need to be used to help enable employees who can recognize data errors to report them for correction. One of the best incentives for relationship managers and credit analysts is to provide them with electronic means to use the data more easily in their everyday work, such as credit analysis and approvals. Giving these individuals incentives to have vested interests in having high quality data can expedite the process. Conversely, if the broader financial institution does not create meaningful motivations for data cleansing, it will likely never get corrected, eventually falling into disrepute and disuse.

Conclusion

Implementing these credit risk best practices can help ensure that credit is not only managed 'right now' for 'this part of the organization', but is ready and reliable for coping with 'this day', 'this week' and 'this month' for the entire organization. Taking these steps can significantly improve a capital markets' response to the daily shocks that can and do happen in today's unpredictable credit risk environment.

About Algorithmics, an IBM Company

Algorithmics is a leading provider of risk solutions. Financial organizations from around the world use Algorithmics' software to help them make risk-aware business decisions. Algorithmics' analytics and advisory services assist firms in taking steps towards maximizing shareholder value and meeting regulatory requirements. Supported by a global team of risk experts based in all major financial centers, Algorithmics offers award-winning solutions for market, credit and operational risk, as well as collateral and capital management.

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