Liquidity Optimization: 
Going a Step Beyond Basel III Compliance
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The financial crisis that began in 2007 highlighted the major shortcomings of the regulatory framework around minimum capital requirements and liquidity requirements. In response, the Basel Committee on Banking Supervision made substantial revisions to its guidelines – specifically, by including more demanding capital and liquidity requirements now commonly referred to as Basel III framework. National banking authorities around the world are adopting the new Basel III framework as a way to eliminate systemic liquidity risk and promote greater transparency of risk management practices.

However, these regulatory changes pose a challenge to banks trying to improve their asset and capital returns. Banks would prefer to reserve the minimum liquid assets or cash to meet their liquidity needs and regulatory requirements because any excess cash reserves can decrease their investment and revenue growth opportunities.

This dilemma has bank officers asking the following questions:

- How do we optimize the amount of liquidity that we maintain?
- How do market factors (such as an increase or decrease in liquidity) and stress events (such as a financial crisis) impact our liquidity ratios?
- How does our liquidity strategy affect our liquidity ratios? How do our liquidity ratios look quarter by quarter for the next three years?
- How do we prove to regulators that our balance sheet is robust enough to manage these exogenous aspects?
- Can we improve our profitability and rate of return without affecting our liquidity and compliance needs?

As shown in Figure 1, answering these kinds of questions requires looking at more than just one liquidity metric – or even several in isolation. Banks need a deep understanding of the interrelationships between the focus areas of banks (from a liquidity perspective), the metrics used to understand current and future liquidity, and cash flows.

In the Federal Reserve Board’s most recently approved rule, US banks are required to maintain a minimum ratio of common equity Tier 1 capital to risk-weighted assets of 4.5 percent and a common equity Tier 1 capital conservation buffer of 2.5 percent of risk-weighted assets.

Figure 1: There are complex interrelationships among liquidity focus areas, metrics and cash flows.
As explored in this paper, the SAS® liquidity risk solution helps you answer these types of questions with confidence by providing:

- A single data model for managing all aspects of liquidity risk and intraday liquidity management.
- A risk engine that uses SAS’ or your bank’s pricing models to generate cash flows for various asset, liability and off-balance-sheet items for a variety of scenarios.
- Optimization capabilities based on the constraints imposed by your bank.
- Regulatory and management reports.

SAS: Delivering the Keys to Liquidity Optimization

As shown in Figure 2, SAS offers a complete liquidity optimization solution that’s uniquely able to integrate liquidity risk management into your banking operation processes while helping you meet Basel III liquidity requirements and need to drive business growth. The solution empowers you to:

- Meet both your bank’s liquidity needs and the minimum standards of Basel compliance.
- More effectively allocate and use capital and funding, and better execute investment and revenue growth strategies.
- Go a step beyond just meeting Basel III liquidity requirements – and actually increase profit and reduce cash opportunity cost.

A Comprehensive Solution

SAS’ liquidity optimization solution is comprehensive, providing a liquidity risk framework that incorporates the various forms of liquidity and the linkages between them. These linkages allow cash-flow and liquidity analyses to be performed across all levels of the bank – business units, LOBs, entities and so on.

With this framework, you get a clear view of your cost of funding and its relevant liquidity and performance metrics, including required liquidity cash buffer, available net stable funding, and liquidity coverage ratios. The SAS solution helps your bank increase revenue and profitability by decreasing funding costs and mitigating risk. This enterprise-wide view of liquidity and risk also allows you to use a more proactive investment strategy and promote transparency, which leads to better – and more confident – decision making.

Forward-Looking Insight

The SAS liquidity optimization solution is also forward-looking, allowing you to optimize liquidity planning and execution over future time horizons, multiple months and even years. Factors such as market movements and stress events can affect liquidity risk over time, so it’s vital that you be able to understand their potential future impact on your bank.

For example, you may need to monitor optimal contractual maturity mismatch to identify potential gaps between the contractual inflows and outflows of liquidity that go beyond five or 10 years. A liquidity optimization solution will enable the...
design and execution of an optimal hedging scheme that’s subject to your bank’s counterbalancing capacity with minimum credit facility costs. This kind of analysis can help your bank become more proactive with a clear understanding of potential liquidity in each of these future time bands for operational planning. Hence, your bank can focus on strategic asset and capital allocation and funding for greater return on equity.

High Performance

Finally, the SAS solution for liquidity optimization is designed for high performance, so you can perform optimization for all portfolios containing millions or even billions of transactions – all in a matter of seconds or minutes. This is critical today, as analyses often involve large numbers of market variables and states, complicated instruments and models, and changing business constraints and policies. Only high-performance computing can handle such data size and complexity, as well as scale the optimization of process and performance.

To illustrate the importance of having a high-performance solution, consider the following scenario: you’re asked to project future cash flows for a portfolio containing only 1,000 positions in 3,000 simulated market states over 36 future time horizons. This optimization analysis would easily result in 108 million calculations, which could take hours – even days – if you used a traditional computing approach. But with a high-performance-enabled risk engine, it would take only minutes – even seconds – to find the optimal asset holdings to maximize portfolio return while meeting liquidity needs for the next three years. Having such a high-performance solution would significantly speed up decision making for investment and hedging strategies.

Overcoming Barriers to Implementing Liquidity Optimization Solutions

Many banks are not yet equipped with the necessary tools and capabilities to take advantage of SAS’ advanced liquidity optimization solution. Most commonly, banks need to enhance their infrastructure in three areas:

- Data integration.
- Computing capabilities.
- Interactive monitoring and reporting.

Data Integration

Organizationwide liquidity optimization requires an enterprise-level approach, which means you need an integrated risk management system that consolidates various data sources and related models. Being able to effectively integrate data is even more important for banks with global operations and investments, as they need to achieve risk aggregation and consolidation across different currencies, local rules, time zones and more. An integrated risk management system will facilitate interaction between finance and risk, giving you a complete picture of risk drivers and capital determination.

Using a unified data management platform with embedded data quality functions and common metadata for data management and analytics, SAS provides enterprise data integration, ETL and ELT capabilities. These capabilities work together to boost user productivity and accelerate time to insight. In addition, SAS provides virtual views of traditional and emerging data sources, extremely high-volume low-latency pattern matching and decision management, and self-service big data preparation and data cleansing capabilities for business users.

Computing Capabilities

To generate reliable optimization results that allow for future liquidity and growth, you need to use simulated future cash flows based on simulated market states across multiple future time horizons. Operationalizing this requires a high-performance risk engine that ensures timely and uninterrupted completion of the optimization process.

Most banks can only perform liquidity optimization over a single time period with limited simulation replications. This makes it difficult to project liquidity needs and execute hedging strategies to reflect market dynamics. In addition, many banks are expected to stress-test their liquidity position under various adverse scenarios. If the bank isn’t adequately equipped with high-performance computing capabilities, it will struggle to:

- Identify potential liquidity issues and investment options.
- Validate procedures to monitor compliance with supervisory directives and internal policies.
- Implement effective liquidity and funding management internal controls and review.
SAS delivers the computing power you need for liquidity optimization and cash-flow stress testing through the SAS risk engine, which is powered by high-performance computing technology. Liquidity optimization performed on simulated cash flows can involve billions of records and calculations, particularly in the case of multiple horizons. With SAS High-Performance Risk, which runs the SAS risk engine, this can be completed in a matter of seconds or minutes.

You can also use SAS to perform liquidity stress testing to optimize liquidity buffers, coverage ratios, and use of capital and funding. The combination of robust optimization methodology and cutting-edge computing technology enables you to perform timely, intraday calculation of key liquidity risk metrics.

**Interactive Monitoring and Reporting Capabilities**

Liquidity management and asset allocation activities, which are supported by the SAS liquidity management solution, require banks to have an enhanced, continuous monitoring and reporting system to track liquidity positions and compliance reporting, as well as the ability to generate investment scenarios and funding plans.

For instance, imagine that your bank wants to monitor and manage regulatory liquidity ratios, funding gaps, risk concentration, optimization of capital allocation and efficiency on a monthly basis, based on its business and risk strategies. To do this effectively, you need a way to extract the right information from large amounts of data and various analytical results. This typically involves using automated ETL and reporting systems that provide high levels of speed, transparency and flexibility. When banks lack such systems, they spend a great deal of time and manual resources pulling data from multiple places and systems – just to generate static reports that quickly become out of date.

SAS makes it easy to meet reporting needs with [SAS Visual Analytics](https://www.sas.com/en/us/software/visual-analytics.html). Powered by high-performance technology, it allows business users at all levels to explore and understand optimization input data results and quickly spot potential liquidity patterns and relationships. SAS Visual Analytics is powered by industry-leading analytics to provide great scalability and mobility. The reporting capabilities make sophisticated results easy to interpret – even when enormous data is involved.

For example, you can simultaneously examine required and available stable funding and cash-flow balance against profitability over simulated time horizons across lines of business, portfolio books, or asset types to understand their correlations. You can also interact with specific risks and liquidity metrics to trace possible root causes, including net interest income, financial margin and liquidity coverage ratio. This kind of exploration can help you see if your bank has the appropriate amount of liquid assets for healthy business growth. You can also identify where potential investment opportunities are, as well as easily compare various scenario options and make informed decisions about which set of optimization objectives and business constraints to use. Once a scenario is implemented, you can monitor and track what happens to the bank’s capital, assets, liquidity and funding – and more importantly, understand why outcomes occurred and develop proactive strategies for hedging, for instance.

A well-deployed liquidity optimization solution will give you the ability to meet liquidity needs and minimum standards of Basel compliance.

**A Snapshot of SAS® Liquidity Optimization at Work**

So how do the various elements of the SAS liquidity optimization solution work together to help you optimize liquidity? SAS' integrated risk management system provides unified model definitions that allow you to generate accurate and consistent risk measurements by addressing core business requirements and constraints. You have the flexibility to define and update optimization settings based on your bank’s business and compliance needs.

For example, your bank can take full advantage of its liquid assets and generate revenue – while remaining within liquidity guidelines and policies – through accurate stress and contingency planning. The solution also allows you to maximize the expected return on the investment portfolio, as well as mitigate liquidity gaps with the optimal liquidity hedging and counterbalancing capacity.
In each case, the value of the liquid asset portfolio is bound by the liquid asset requirements and investment return. Portfolio return is maximized over a specified horizon subject to the control of investment portfolio risk and liquidity gaps at the cash-flow horizons. Furthermore, many business constraints can be imposed to meet the needs of the bank, including portfolio composition constraints, cash balance constraints, short-sale constraints. That capability will help you construct an effective liquidity inventory and maintain sufficient liquidity with a high probability concerning different levels of liability growth rates.

Learn More

Since the 2008 financial crisis, changing business dynamics and regulations have created significant challenges to banks seeking to stay profitable while meeting liquidity requirements. SAS can help banks meet those challenges – even turn them into opportunities. With SAS liquidity optimization capabilities, you can integrate risk strategies into business development processes for competitive advantage. You can go beyond Basel III liquidity compliance to achieve maximum profitability. And you can quickly get to the answers that give you the optimal asset allocation and hedging strategies.

To learn more, visit sas.com/risk.