REPRINT

R&C risk & compliance

LIQUIDITY RISK MANAGEMENT

REPRINTED FROM:
RISK & COMPLIANCE MAGAZINE
OCT-DEC 2019 ISSUE

www.riskandcompliancemagazine.com

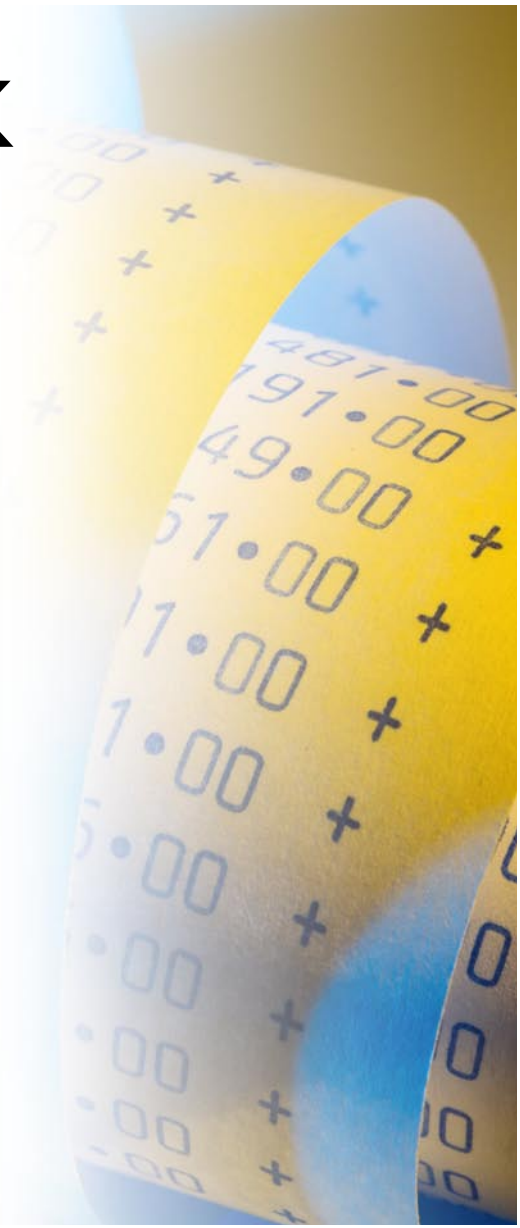
Visit the website to request
a free copy of the full e-magazine

Published by Financier Worldwide Ltd
riskandcompliance@financierworldwide.com

www.riskandcompliancemagazine.com

ONE-ON-ONE INTERVIEW

LIQUIDITY RISK MANAGEMENT



Maged Tawfik
Financial Risk Specialist
SAS

Dr Maged Tawfik holds a PhD from Cornell University in Engineering with a focus on systems reliability under stochastic excitations. In addition to his theoretical expertise, his field experience spans a broad range of financial markets topics, from derivatives modeling and trading to risk management. Dr Tawfik served in different roles at Merrill Lynch, UBS and Swiss Re. He also served as Chief Quantitative Strategist at major hedge funds. Dr Tawfik is currently a Financial Risk Specialist with SAS Institute where he advises banking and capital markets clients. His latest efforts are focused on all issues pertaining to liquidity risk.

R&C: Although liquidity management has always been a central treasury function, only recently has liquidity risk been recognised as a primary risk. What changed?

Tawfik: In the three decades since the advent of modern quantitative risk management, it has been assumed that markets were rational and efficient. This meant that the only risk facing a high quality asset was market risk. More specifically, an asset of a low credit risk should always have a viable market price. The 2008 financial crisis proved otherwise. Systemic liquidity stress caused assets of high credit quality to suffer major price dislocations. This resulted in the recognition of liquidity risk as a legitimate primary risk. Consequently, the need for the development of rational liquidity risk management methodologies and, in many cases, an independent liquidity risk management function, became apparent.

R&C: As a quick remedy to the apparent unpreparedness of banks for liquidity risk management, regulators required banks to report on their liquidity sufficiency via measures such as liquidity coverage ratio (LCR) and net stable funding ratio (NSFR). How adequate are such measures in addressing liquidity risk?

Tawfik: In the immediate aftermath of the 2008 financial crisis, regulators rushed to install expedient measures to stem the stark absence of liquidity risk management. The result was the stopgap measures of liquidity cover ratio (LCR), net stable funding ratio (NSFR) and similar asset to liability measures. Such ratios are useful as a spot liquidity health check. As such, they exposed the precarious liquidity profile of many important financial institutions. Such ratios, however, should not be considered coherent liquidity risk management tools. This is due to two main deficiencies. First, they ignore the dynamic multistage nature of liquidity management. For instance, preparing for a liquidity shortage well in advance may yield totally different results from a delayed reaction. Secondly, all such measures tend to be prescriptive in nature. This introduces artificial market dislocations. A credit downgrade of a single notch of an asset may cause it to become unacceptable as a valid high-quality liquid asset (HQLA) for LCR purposes. This has the effect of causing irrational price dislocations. In addition, assets to which a regulator assigns the highest quality are expected to escape any liquidity risk management. This is equivalent to a put option on such assets written by the regulator.

R&C: For systemically important banks, regulators require reporting on a resolution and recovery plan with measures such as resolution liquidity

adequacy and positioning (RLAP) and resolution liquidity execution need (RLEN). In your opinion, how useful and adequate are such measures?

Tawfik: To mitigate systemic risk, regulators require financial institutions deemed 'too big to fail' to provide a living will or, in other words, a recovery and resolution plan (RRP). This includes the two dynamic measures of resolution liquidity execution need (RLEN) and resolution liquidity adequacy and positioning (RLAP). Since they are dynamic in nature, these measures remove the first of the two deficiencies associated with spot measures. Liquidity needs and availability over a period of up to six months are dynamically addressed. These measures, however, continue to suffer from the prescriptive liquidity categorisation of assets with its defective implications with respect to spot measures. In addition, prescriptive liquidity categorisation artificially constrains the stochastic nature of the dynamic analysis.

R&C: When implementing RLAP and RLEN, what additional data and modelling complexity do they involve?

Tawfik: As dynamic liquidity risk measures, RLAP and RLEN have specific modelling demands. They expect appropriate modelling of the market risk of asset and derivative positions. They also expect the proper modelling of the credit risk of all non-tradable assets. In addition, liquidity management requires the modelling of behavioural cash outflows and inflows. While market and credit models are usually readily available within the financial institution, behavioural models may need to be developed from scratch. Moreover, market risk impact on liquidity usually involves margin agreements. The proper modelling of such agreements and all associated collateral is essential. From a data point of view, the aggregation of the output of the aforementioned risk models from the various business units has its own challenges. Data quality, sufficiency and completeness pose a serious impediment to

"Market risk impact on liquidity usually involves margin agreements. The proper modelling of such agreements and all associated collateral is essential."

Maged Tawfik, SAS

effective liquidity risk management. Collateral forms the lifeblood of bank liquidity. Complete collateral data, including dated source and use allocation, is essential for appropriate liquidity management.

R&C: In your opinion, what is a coherent approach to liquidity risk management?

Tawfik: Liquidity management is unique in its path dependence. The sale or pledging of assets on a given day may hinder the ability to generate sufficient liquidity later. Moreover, a large volume asset sale or pledging can influence the asset price or haircut. Thus, proper liquidity risk management requires a multi-period stochastic optimisation. The following ingredients are needed in such an approach. First, a future analysis horizon. Second, scenario trees constructed from the stochastic market, credit and behavioural model outputs. Third, volume-sensitive asset price and haircut models. Fourth, forward contractual cash inflow and outflow estimates. Finally, all additional asset and collateral constraints. A multi-period stochastic optimisation approach as such can be solved using multi-stage linear programming methods.

R&C: Stress testing and scenario analysis are the hottest buzz words in credit and market risk management. How relevant are they with respect to liquidity risk? Does liquidity risk require additional modelling or implementation complexity?

Tawfik: Generating forward-looking scenarios is a primary ingredient of optimal liquidity risk management. Due to its path-dependent nature, scenario utilisation in liquidity modelling has few additional requirements. First, due to the multi-period nature, liquidity scenarios come in the form of scenario trees. Second, for the purpose of optimisation, scenarios should be probability weighted. Third, scenario paths leading to an inadmissible state should be ignored. This last point means that if a bank is deemed insolvent in a certain scenario, there is no point in including that state in the optimisation algorithm, as it affords the bank no benefit overall.

R&C: Is there a business case for optimal liquidity risk management?

Tawfik: The classical tension between the cost of risk management, on the one hand, and profitability, on the other, has been a well-recognised impediment to proper risk management. The shortsighted need for quarterly profitably that fits within peer group benchmarks can emphasise this tension. As a result, risk management practices tended to drift toward peer average. This can be even more pronounced when it comes to

liquidity risk, as the benefits of proper liquidity risk management are more pronounced during severe market dislocations. Banks may have to forgo significant profits for long periods of time before the gains from liquidity risk management become apparent. A multi-stage stochastic optimal liquidity management framework may offer a remedy to this tension. It will allow the bank to satisfy regulatory risk management constraints at the cheapest cost to the bank. Properly presented, a coherent risk management approach may win the approval of the regulator in lieu of a more penalising prescriptive approach.

R&C: What is a typical roadmap for building a state-of-the-art liquidity risk management system?

Tawfik: Extensive multi-year deposit, loan payment and credit and liquidity facility withdrawal data is needed for developing behavioural models. Accurate and comprehensive margin agreement data is needed for proper collateral flow tracking. Timely collateral custody data and source use tracking is crucial for building a useful collateral management system. More importantly, the bank should be able to collect coherent and accurate relevant data from its various business units. Banks should, therefore, start by addressing their data situation. In parallel with the data effort, the bank should be addressing the missing components of its market, credit and behavioural models. Forward-looking business flow models should also be included in the liquidity toolbox. In parallel, as well, the bank should construct liquidity scenario trees. This is usually done by identifying the risk factors that most dominate the bank's business practices. History-guided simulations can be used to create statistically valid scenario trees. Such simulation-generated trees can be enhanced by the addition of extreme tail cases. The final building block is the development of a multistage optimisation module that applies the input data and risk factor scenarios to the set of models generating liquidity strategies and risk metrics as output. R&C