Development of a Simulation-based Model to Quantify the Degree of a Bank's Liquidity Risk

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Abstract

This study investigates whether simulation-based models can be used to predict liquidity risk for banks, which must comply with Basel III by January 2015. The importance of holding more capital has become the main prerequisite for Basel III, which emphasizes a strong liquidity framework to support funding, but the aftermath of the global financial crisis that began in 2007 poses an even greater challenge to the banks that have to meet their obligation to remain solvent. In the current scenario, to achieve economic recovery globally, banks must manage their liquidity gap. The concept of liquidity risk has emerged as the new problem for such banks and must be measured and managed.

The paper looks at the process of developing a measurement framework using Black-Scholes and Merton's asset-based models to measure liquidity risk. The study shows how to apply these models in measuring liquidity risk, to determine the probability of reaching the stage of insolvency and to estimate the probability of being unable to meet payment obligations. This provides a foundation for implementing a solid liquidity framework required by banks to meet the Basel III standards.

The study showed that liquidity risk can be measured using static liquidity gaps from Monte Carlo simulation. The main findings from this study were: the models can be used further to provide the probability of a bank becoming insolvent within six months and quantify the probability of a bank's failure to meet its payment obligation.

The measurement of liquidity risk shown in this study provides a framework for managing liquidity in banks based on static measures of liquidity gaps. This serves the need for a global liquidity standard and an effective supervisory review process for Basel III.