Working Papers on Economics - Estimating Financial Institutions' Intraday Liquidity Risk: A Monte Carlo Simulation Approach

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The most recent financial crisis unveiled that liquidity risk is far more important and intricate than regulation have conceived. The shift from bank-based to market-based financial systems and from Deferred Net Systems to liquidity-demanding Real-Time Gross Settlement of payments explains some of the shortcomings of traditional liquidity risk management. Although liquidity regulations do exist, they still are in an early stage of development and discussion. Moreover, no all connotations of liquidity are equally addressed. Unlike market and funding liquidity, intraday liquidity has been absent from financial regulation, and has appeared only recently, after the crisis.

This paper addresses the measurement of Large-Value Payment System's intraday liquidity risk. Based on the generation of bivariate Poisson random numbers for simulating the minute-by-minute arrival of received and executed payments, each financial institution's intraday payments time-varying volume and degree of synchrony (i.e. timing) is modeled. To model intraday payments' uncertainty allows for (i) overseeing participants' intraday behavior; (ii) assessing their ability to fulfill intraday payments at a certain confidence level; (iii) identifying participants non-resilient to changes in payments' timing mismatches; (iv) estimating intraday liquidity buffers. Vis-à-vis the increasing importance of liquidity risk as a source of systemic risk, and the recent regulatory amendments, results are useful for financial authorities and institutions.

The opinions and statements are the sole responsibility of the author and do not necessarily represent neither those of Banco de la República nor of its Board of Directors. Results are illustrative; they may not be used to infer credit quality or to make any type of assessment for any financial institution. The author is indebted to Clara Machado for the numerous and vital discussions that supported the model's design and the document's final version. Valuable comments and suggestions were provided by Fernando Tenjo, Joaquín Bernal, Freddy Cepeda and Fabio Ortega. LVPS data was processed with assistance from Freddy Cepeda and Fabio Ortega. As usual, any remaining errors are the author's own.