

An Analysis of Liquidity Risk and Banking Crisis

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論 文 内 容 の 要 旨

Lessons learned from the recent financial crisis from 2007 to 2009 display a different scenario in which liquidity shortage in the interbank lending and wholesale funding became the major cause of extensive banking crisis. The loss of confidence that emerged due to the defaults associated with subprime mortgages and derivatives suddenly accelerated after the bankruptcy of Lehman Brothers. The underlying financial risk behind banking crisis has evolved dramatically into new forms. Urgent demands from borrowers and creditors during the crisis raise questions concerning liquidity risk in the financial system. Unlike market risk, credit risk and operational risk, it is usually difficult to find formal measurements for liquidity risk, which implies why liquidity risk is often called the “known unknowns”. Although attention has been drawn to proper identification and timely monitoring, the inherent mechanism of liquidity risk is still not fully studied in the aspect of behavioral patterns on the demand side of cash flow. The goal of this dissertation is to supplement the previous theories and concepts on banking crisis with more detailed investigation of liquidity risk in banking institutions.

Chapter 1 presents an introduction of liquidity risk regulation and measurement tools in the banking system. The first section reviews the practice of financial risk regulation. The second section presents the classification of liquidity risk, namely, market liquidity risk and funding liquidity risk and analyzes the intrinsic shortcomings of the measurement methods in each category. The third section discusses the new reform in liquidity risk regulation in Basel III, especially focusing on Liquidity Coverage Ratio and Net Stable Funding Ratio. The fourth section presents the research motivation and analytical framework employed in this dissertation.

Chapter 2 analyzes the dynamic features of banking crisis. The purpose of this chapter is to set the tone in a macroeconomic perspective for exploring latent system-wide nature in the banking sector. Typical systemic risk measurement barely captures the dynamic risk characteristics of the whole banking system. As experience of past financial crises shows, major indicators in financial markets have clustered volatility during the periods of economic downturns, while this chapter is focused on the overall profile of the commercial banking sector and the Ratio of Adjusted Weighted Estimated Loss as an indicator of banking crisis is introduced to analyze the volatility clustering in a system-wide perspective. The results show that the volatility of the crisis indicator tends to cluster together when distress signals begin to appear in the market. Leverage effect is also presented in the results by applying EGARCH model. The analysis of the effect of cyclic shocks discusses the process of risk transferred from exogenous shocks to endogenous contagion. The results have implications for a better understanding of the relationship between business

cycle and banking crisis.

Chapter 3 studies general investors' framing effect of decision-making and how this pattern affects the resource allocation and investment strategy of commercial banks. The theoretical framework discusses the bank run equilibrium with the employment of framing effect in Prospect Theory. Few derived versions based on the classic bank run model have taken into account the framing effect of general lenders. This chapter revisits the issue by developing a model of bank run equilibrium combined with biased risk preference, which is applied to analyze how portfolio allocation and liquidity buffer in commercial banks are affected by liquidation cost and the reference point. Another improvement comes from the incorporation of liquidity buffer in the constraints of the bank run model. In the setting of this chapter, liquidity buffer is defined to meet the contingent demands from wholesale funding. The results present the condition on which the liquidity buffer of a particular bank should be provided. Liquidation cost is positively correlated with the lower bound of liquidity buffer. The location of the reference point is very important in determining the payoffs received by early withdrawals and late withdrawals. The effect of the reference point on liquidity buffer partially depends on the slope of yield curve term structure. Higher reference point could typically cause a lower portion of long-term investment. The empirical evidence supports the theoretical results to some extent.

Chapter 4 re-evaluates the sources of funding liquidity risk in financial intermediaries and analyzes the relationship between liquidity demands and bank failures. The function of credit intermediation and liquidity provision is the specialness of depository institutions. However, since the funding liquidity risk can be evaluated by examining the structure of liabilities as well as off-balance sheet activities, the advantage of combining deposit-taking and lending to share the cost of holding certain amount of liquid assets needs be reconsidered. The activities from both on-balance sheet and off-balance sheet not only provide liquidity to borrowers and depositors but also reduce the cost of liquidity holding, because the validity of this mechanism depends on the prerequisite that exercises on loan commitments and withdrawals on deposits are not perfectly correlated. However, it matters to reveal the dynamic connections between the two sources of liquidity risk for the purpose of analyzing the real impact on individual banks from a more microscopic perspective. As the evidence shows, by using an inclusive data set from 2001 to 2016, a winner-take-all effect is uncovered and could cause simultaneous claims for cash flow from both deposits and borrowings through loan commitments. Particular banks in critical financial condition will experience this typical double outflow. Similar results are shown in the subsamples of large banks and small banks. The evidence of connection between the double outflow and bank failure is presented by applying Support Vector Machine to predict bank failures based on the outflow variables as input features. It indicates that double outflow should be taken into consideration in addition to the traditional indicators such as financial ratios. The results also provide new insights on liquidity management of commercial banks.

The last chapter presents concluding remarks and policy implications. It summarizes the major conclusion that behavioral patterns underlying liquidity risk play an indispensable part in financial distress of individual institutions as well as liquidity shortage in the whole banking sector. In a system-wide context, dynamic features of banking crisis provide a supplementary understanding to improve the current static measurement of systemic risk. Potential directions of future research, especially on the topic of optimal liquidity buffer in commercial banking sector, are also presented.