An Examination of Bank Risk Measures and their Relationship to Systemic Risk Measurement

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Abstract

This research explores ways of measuring bank risk, both individual bank risk and systemic risk, with the main focus on z-score. Z-score is a popular indicator of individual bank risk-taking. Despite its popularity among academics, there is a lack of consensus on a standard way to construct a time-varying z-score measure. Meanwhile, in the post-GFC period, increasing attention has been given to macro-prudential policy and its role in mitigating systemic risk.

This research discusses major challenges in existing approaches to the construction of time-varying z-score measure. It empirically compares these approaches using quarterly data of New Zealand banks. Both conceptual discussions and empirical analyses support the use of a rolling window in the computation of time-varying z-score, which is consistent with changing bank risk profiles through time. This research is also the first study to propose a risk-weighted z-score measure.

This research further proposes a new systemic risk measure based on z-score, which is developed on the concept of Leave-One-Out (LOO) approach. The systemic risk contribution of an individual bank can be captured by the variation of risk-taking of a banking system when excluding the particular bank. The LOO z-score measure can be computed using accounting information only, and is therefore applicable to both listed and unlisted banks. Empirical analysis on the LOO z-score measure in assessing banks' systemic risk contribution is first applied to the New Zealand and Australian markets, and then extended to an international sample including 17 countries. The LOO z-score measure is proved to be useful for assessing banks' systemic risk contribution, with a positive rank correlation with Marginal Expected Shortfall (MES) and Delta Conditional Value-at-Risk (ΔCoVaR).

The LOO z-score measure provides a new approach to assess systemic risk contribution using accounting data, which can be used as a complement to market-based approaches. This measure is especially useful for systemic risk analyses of banks with limited or even no share market data at all, which is the key advantage. The ability to include both listed and unlisted banks in the evaluation of systemic risk is fundamental in macro-prudential policy frameworks.

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