The Engineering of China Commercial Bank Operational Risk Measurement

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Abstract

Drawing specific reserve separately for operational risk is the requirement of the New Basel Capital Accord. Since 1990, as serious loss incidents in operation risk often happened all over the world, operational risk is taken account into the risk management framework for the first time in New Basel Capital Accord, becoming the three main risk get along with credit risk and market risk that bank may take. In the paper, the data of Chinese commercial bank operational risk is analyzed by Monte Carlo simulation empirically. Research shows that China commercial bank should allocate 15 billon capital for its operational risk, capital reserve fund rate is about 4.79%.

1. Introduction

Operational risk is one of important issues in commercial bank operation, which means unexpected loss resulted from inaccurate operation of staff, failure of system, inadequate control and procedure, unauthorized activity or external event. In some business, operational risk is more important than credit risk and market risk. Many banks in the world don't allocate any capital for operational risk, this also happens in China commercial banks. The reason is not that operational risk is not important, but that we don't know how to measure and manage operational risk. One article of Euro Money in December 1996 once said "Banks measure credit risk and market risk and allocate capital for them. The reason is not that credit risk and market risk is the biggest risk they face but that they can do. In fact, operational risk is more important, more dangerous, but no one knows exactly how to deal with it."[1] As a result, Basel committee decided to include operational risk in the capital allocation framework. The measurement of the operational risk is the process of quantification of operational risk. At present, domestic article such as L.Zhang [2] and C.Fan [3] mainly focus on studying the quantification of the operational risk of single commercial bank, and the main method is the basic indicator approach and the income model method. Basing on the research of scholars [4-8], the paper tries to study the overall operational risk of commercial bank industry. The loss amount of operational risk of the whole commercial bank industry is estimated with Monta Carlo simulation.

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2. The capital for commercial bank operational risk

Risk capital, also known as economic capital, is the capital that company or organization use to prevent or ease the nonpayment crisis caused by unexpected loss [9]. The economic capital for operational risk means to prevent the payment difficulty caused by operational risk loss. Economic capital is calculated according to the risk level of commercial bank capital. The premise of calculating the economic capital is that bank must quantitative the risk. Similarly, allocating the capital for operational risk is also based on the quantitative of operational risk. This is the most difficult problem in the management of operational risk.

3. The approach of measurement of capital for operational risk

Three methods of measurement of capital for operational risk are provided in the new Basel Capital. They are the basic indicator approach, standardized approach and advanced measurement approach respectively. Among them, (1) basic indicator approach: capital requirement is equal to a fixed ratio of gross activity indicator such as overall income. (2) standardized approach: use the basic indicator approach for every product line, then sum up and get the capital requirement for operational risk. (3) advanced measurement approach: it includes internal measurement approach, loss distribution approach and scorecard method. Internal measurement approach: use internal loss data to estimate probability of loss event (PE) of combination of different types of product line, the loss generated from expected risk (LGE). Multiply PE, LGE and risk exposure indicator EI to get the expected loss. And multiply expected loss and a fixed ratio and get capital requirement. Loss distribution: use the data of risk loss to simulate its frequency and loss amount and get the specific probability distribution. Calculate VaR, and sum up to get capital requirement. Scorecard method: use loss data and forward-looking risk indicator to assess the risk and measure the relative level of risk [10].

4. The approach of measurement of capital for operational risk that this paper used

Every method measuring operational risk has advantage and disadvantage. Data about the operational risk event are not sufficient, therefore operational risk can only be estimated. The aim of estimation is to determine reserve for operational risk. Operational risk has the character of low frequency, broad range of loss amount distribution and heavy tail. It is difficult to directly use some traditional parameter or non-parameter estimating method. To overcome the lack of data and based on the research experience of other scholars, this paper uses Monte Carlo simulation to calculate the capital for operational risk.

Monte Carlo simulation, also known as statistic test method, is a method using the statistic value to calculate parameters in the random process. It is too complex to formulate a precise mathematical model with character of high reliability when the stability of every unit in this system is known. Then this method will approximate the expected value of the system reliability. With the increase in simulation times, its accuracy is also expected to gradually increase. The empirical analysis will directly use Monte Carlo simulation.

Monte Carlo simulation to measure the risk capital of our commercial banks has two advantages: (1) we can overcome the disadvantage of lack of data, and get more precise data with simulation. (2)because the result of Monte Carlo simulation is the distribution of loss amount of operational risk, we can easily get the quartile at different level from the distribution, and then use the frame of VaR to measure the risk of commercial banking.

5. The measurement of China commercial bank operational risk the research data and description