

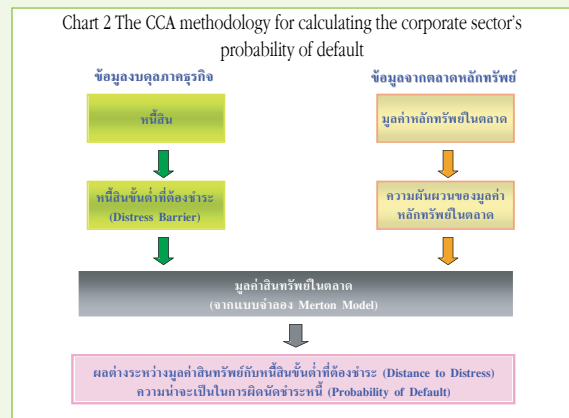
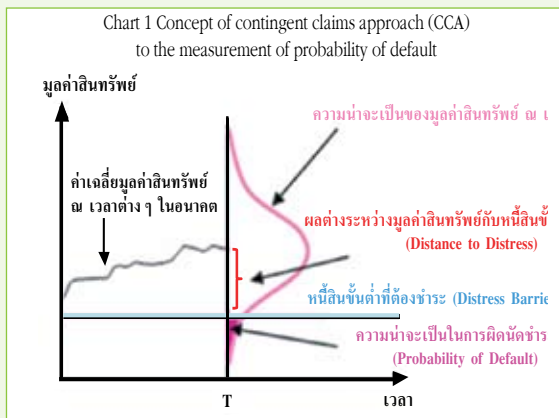
Assessing risks to financial stability: a contingent claims approach (CCA)

Assessing the risks and identifying vulnerability of the different economic sectors in advance and in a timely manner is essential for the maintenance of economic and financial stability. Yet, commonly used assessment methods such as financial ratio analysis and calculation of probability of default (PD) using a qualitative choice model^{1/} are based on financial statements data which are typically lagging. In addition, most financial statements data are recorded on a book-value basis rather than a market-value basis which makes analyses based on them backward-looking, i.e., not reflecting current or future conditions. To circumvent these problems, a contingent claims approach (CCA) model which utilizes up-to-date financial market data to measure the risk or the probability of default of the corporate sector, the government, and financial institutions has been proposed for use in place of traditional assessment methods.

Concept and methodology

In the CCA model, the probability of default is calculated from the difference between asset value and the level of debts to pay back in the future with an assumption that a firm will go bankrupt when its asset value falls below that particular debt level. In other words, the probability of default will increase if a firm's asset value approaches its debt value.

The CCA methodology for PD calculation starts with the computation of the distress barrier -- the minimum debt burden to pay back one year from today which in the following analysis is assumed to equal the sum of the entire book value of short-term debts and one-half of book value of long-term debt. Next, future market values of asset and its volatility are obtained from the movements of its stock price and option-implied volatility according to an option pricing model.^{2/} From these, the distance between the market value of assets and the distress barrier (the distance to default) and the associated probability of default can be calculated.



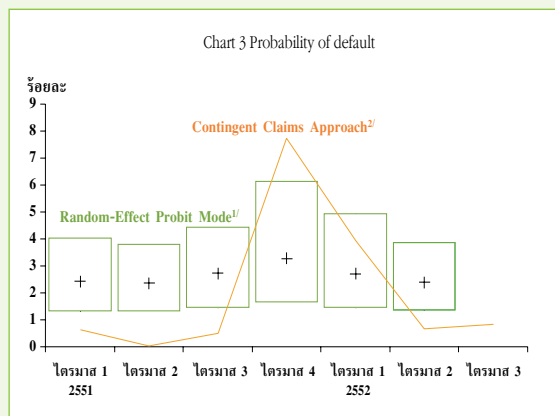
^{1/} For further detail, see the box article "Corporate sector vulnerability analysis from probability of default" in the October 2008 *Inflation Report*, where the random-effect probit model is employed.

^{2/} Option pricing model, e.g., the Merton model, formulates the relationship between equity value and asset value in terms of an implicit call option. See Garpen et al. (2004) *The Contingent Claims Approach to Corporate Vulnerability Analysis: Estimating Default Risk and Economy-Wide Risk Transfer*. IMF Working Paper WP/04/121.

Thailand's case study

The eruption of the global financial crisis had undermined profitability of the Thai corporate sector and consequently elevated its default risk. The corporate sector's median probability of default computed using the CCA model^{3/} rose to 7.8 per cent in 2008 Q4 from below 1 per cent during the pre-crisis period. Nevertheless, the median PD of the corporate sector started to decline in 2009 Q1 along with the easing of global liquidity, returning close to the pre-crisis level at 0.7 and 0.8 per cent in 2009 Q2 and 2009 Q3, respectively. The decline in the PD computed using the CCA model was consistent with the PD calculated from the random-effect probit model, which also adjusted downward in 2009 Q2.

While the CCA model has a distinct advantage in being forward-looking because it reflects future prices and volatility of assets and is based on daily data which makes corporate sector risk assessment timely, the CCA methodology is subject to certain assumptions. For example, the model assumes complete market, perfect information, and stock price movements that are driven by fundamental factors rather than speculation, all of which are simplifying notions of reality. In addition, due to market data requirements, the CCA model can be applied only to listed companies which are generally large firms and cannot be used to assess the risk of the entire corporate sector which includes a vast number of SMEs. Hence, analysis using the CCA model should take into account its limitations and be conducted with care. For a comprehensive risk assessment of the corporate sector's stability, it is therefore recommended that the CCA model be used in conjunction with other indicators.



Note: ^{1/}Each bar depicts an interquartile range, where lower and upper bounds represents the 25th and 75th percentile, respectively and the symbol + displays the median.

^{2/}Indicates the median

Source: The Stock Exchange of Thailand (SET) and calculated by the Bank of Thailand Staffs.

^{3/} Calculation based on stock prices of 420 non-financial listed firms and 6-month-ahead implied volatility of SET50.