

Transition Matrices: Filling a Risk Management Gap

Cyclical economic factors should be incorporated in existing credit models.

Credit risk analysis models provide decision-makers with insight into the financial health of a company, private customer or traded security. These models function by computing each component's probability of default and integrating it as a rating (AAA to BBB), thereby creating a "stationary" ratings matrix that serves as a repository for future risk calculations.

However, the recent financial crisis (and the wave of defaults it caused) underlined the inadequacy of existing models in the face of changing market conditions; many managers found that the models they were using weren't varying with the evolving conditions and that the gaps they saw could be reduced if market and economic conditions were somehow integrated in the models.

Ratings downgrades and defaults are more likely during economic downturns. Anecdotal evidence suggests that systematic factors affect loss-given default (LGD), probability of default (PD) and exposure-at-default (EAD). Recovery rates, the main parameter of LGD, can fluctuate over time and are negatively correlated with short-term default risk-free rates and increased interest rates (which are usually consistent with economic downturns); this can lead to reduced recovery rates and increased LGD.

Part of the problem with existing credit risk analysis models is that they do not

incorporate these cyclical macroeconomic phenomena — e.g., uneven phases of expansion and contraction in economic cycles. Consequently, the individual assessment of credit risk is flawed.

Potentially, however, this problem can be solved through the creation of matrices that can differentiate between times of expansion and times of recession; the matrices examined in this short article are characterized by cycles and can be modeled and integrated into a credit risk management system.

Credit rating migration/transition matrices measure the expected changes in credit quality of borrowers stemming from the business cycle. By separating the economy into two states, expansion and contraction, and conditioning the migration matrix on these states, the distribution of losses can differ greatly.

Benefits of a Transition Approach

Often the majority of the coefficients of variation in a recession matrix are significantly lower than those in a standard matrix. Whereas coefficients of variation in an expansion matrix are on average lower than those in a standard matrix, according to Standard & Poor's (S&P)¹, the recession matrix generally produces a sevenfold drop in the level of volatility. The coefficients of variation of the PD are lowered even further.

In general, these results tend to show that the transition probabilities are more stable during periods of recession, which

confirms that there is a correlation between business cycles and ratings.

By proceeding in this way (with the chosen transition frequency), we obtain two transition matrices: one corresponding to expansion, the other to recession. In a recession, credit ratings fall, the probability of default increases and extreme migrations are more widespread. The coefficients of variation, however, tend to be less volatile in a period of contraction than they are in an unconditional transition matrix. A BBB rating is common for the recession matrix, whereas an expansion matrix typically yields an A rating.

According to S&P, the default trajectory for the transition matrix generally minimizes the total percentage of companies defaulting. Over a short period, the differences between a stationary matrix and a transition matrix are minimal; over a longer period, however, the variations increase — i.e., the percentage of issuers defaulting (in the transition matrix) is minimized and the probability difference comes from a large share of companies with A ratings.

FOOTNOTE

1. See Standard & Poor's data cited in "Ratings Migration and the Business Cycle, With Application to Credit Portfolio Stress Testing," a white paper written by A. Bangia, F. Diebold and T. Schuermann. (Wharton Financial Institutions Center, Sept. 28, 2000.)

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