Stress EAD: Experience of 2003 Korea Credit Card Distress

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Abstract

The Advanced-IRB banks should be able to demonstrate to the regulatory supervisors that the long-run exposure at default (EAD) and downturn (or stress) EADs are validated with their own data on historical exposures. This paper proposes an empirical stress EAD model that is driven by a risk driver of the credit conversion factor (CCF) and by a systematic factor governing the cyclical effects of EAD and PD of facilities. Stress EAD is then computed as the expected value of EAD conditional on a particular value of the risk driver of a facility and on the value of a systematic factor that achieves, say, a 99.9% confidence level for a desired A or BBB+ rating. The reference data set (RDS) studied in the paper covers the corporate credit card exposures from 2001:Q1 to 2005:Q4. The most intriguing aspect of this RDS is that the sample period covers the severe 2003 credit card distress witnessed in Korea, which makes it an excellent candidate for developing and validating the stress EAD models. The empirical evidence would provide ample opportunity to a better understanding of the meaning of $\Phi^{-1}(0.999)$ in the New Capital Accord.

Keywords : Credit Conversion Factor (CCF); Single-factor Model; Exposure at Default (EAD); Downturn Risk Parameters

JEL classification : G31, G38
1 Introduction

The New Capital Accord, or referred to as Basel II, allows those banks that plan to adopt the Advanced Internal Ratings Based (IRB) approach to use their rigorous estimates for risk parameters such as the probability of default ($PD$), loss given default ($LGD$), and exposure at default ($EAD$). As Gordy and Howells (2004) points out, formulaic Pillar 1 rules are derived from asymptotic approximations to the risk-factor models and for large, well-diversified banks, regulatory capital under the IRB approach should approximate VAR for a one-year solvency probability of 99.9%, which roughly corresponds to an A- or BBB+ rating. The bank minimum capital requirement ($K_{IRB}$) is typically given by

$$K_{IRB} = [LGD \cdot \Phi \left( \frac{\Phi^{-1}(PD) + \sqrt{\rho} \Phi^{-1}(\alpha)}{\sqrt{1-\rho}} \right) - PD \cdot LGD] \cdot EAD$$

which is evaluated at a 99.9% confidence level for a desired debt rating, namely, $\Phi^{-1}(0.999)$, where $\Phi^{-1}(\cdot)$ denotes the inverse of normal distribution function and $\rho$ denotes the coefficient of asset correlation.

The IRB capital formulae such as equation (1), however, omit important systematic credit risks that are driven by stochastic nature of $LGDs$ and $EADs$ on undrawn credit commitments. Since defaults tend to be clustered during times of economic distress, the Basel Committee requires that Advanced-IRB bank’s $LGD$ estimates be long-run estimates that account for the possible correlation between recovery rates and default rates. Empirical evidence concerning $LGDs$ indeed suggests significant time variability in realized $LGDs$ (see, for instance, Frye (2000), Altman, Brady, Resti and Sironi (2004), Araten, Jacobs, and Varshney (2004), Dullmann and Trapp (2004), Schuermann (2004), and Kim (2006)). Kupiec (2006), for instance, proposes an modified formula that allows for the cyclical $LGD$, modeled as a latent Gaussian factor model, explicitly in the computation of regulatory minimum capital. He demonstrates a discrete approximation of, so-called the “stress $LGD$”

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2 See, Gordy (2003), for detailed discussions on the theoretical background of the Pillar I formula.