The role of correlation

In this second column on the potential pro-cyclicality of Basel II, David Rowe surveys recent research on the role of correlation between probability of default and recovery rates, as well as among default probabilities

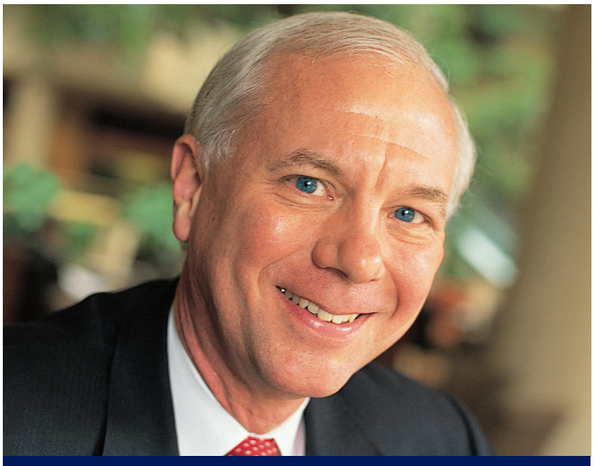
There is a strong intuition that default rates (DR) and recovery rates (RR) will exhibit a negative correlation over time. In their July 2002 BIS working paper, Altman, Resti & Sironi examined this question using annual US non-investment-grade bond market data from 1982 through 2000.[1] On a univariate basis, they found clear empirical evidence for such a negative correlation. The relationship appears to be non-linear, with RR dropping rapidly from around 55% when DR is in the range of 1.0% to 1.5%, to around 35% when DR rises to 4%. Thereafter, the relationship flattens out, with predicted recovery rates still between 25% and 30% for default rates as high as 10%.[2]

The authors examined a number of multivariate models to examine potential causes for this observed correlation. A common hypothesis is that both DR and RR are dependent on general economic conditions as measured, for example, by the change in GDP. Interestingly, while the annual growth rate in GDP exhibits a significant negative correlation with DR (–0.67), it is only weakly correlated with RR (–0.11).

The authors also examined the inclusion of both general economic variables and bond market specific variables in addition to DR in a multivariate equation for RR. The bond market indicators they use are the dollar amount of outstanding bonds and the dollar amount of defaulted bonds. As nominal amounts in an equation for a dimensionless recovery rate, these appear to introduce some questionable long-term dynamics. Nevertheless, they improve the explanatory power of the equation considerably more than does inclusion of general economic variables. The authors argued that this points to micro supply and demand conditions in the bond market being more relevant to the behaviour of RR than are broader macroeconomic variables.

Another avenue of enquiry concerning the impact of macroeconomic conditions on recovery rates would be to examine possible lead/lag relationships. But it is likely that data with a higher frequency than the annual observations used by Altman, Resti & Sironi would be required to isolate any such pattern.

Regardless of the causal dynamics, however, a negative correlation between default rates and recovery rates (and a corresponding positive correlation between default rates and loss-given default (LGD)) would tend to reinforce pro-cyclical changes in regulatory capital under Basel II rules.[3] Of course, the Altman study focuses on the market for bonds not bank loans, and further confines its attention to the non-investment-grade segment of that market, so its findings must be viewed with caution. But the empirical analysis points strongly to the conclusion that the behaviour of LGD will aggravate, not mitigate, concerns about pro-cyclical regulatory capital under the proposed Basel II rules.



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The theory and evidence on cyclical behaviour of correlations between the probability of defaults (PDs) for different firms is mixed. In a September 2002 BIS working paper, Philip Lowe surveys these results.[4] There is some evidence based on stock prices and the Merton model of default that these correlations tend to increase during times of financial stress. If default probability correlations rise with increases in default rates themselves, then the cyclical behaviour of actual credit losses will be greater than that implied purely by the changes in PDs.

The approach implicit in the Basel II framework does recognise that correlations are important for determining appropriate capital levels. The Basel Committee's original approach assumed that correlations are driven by a single systematic factor.[5] In its January 2001 proposal, it further simplified the approach by assuming that all borrowers have the same sensitivity to that single risk factor. This is the basis for the assignment of a common asset correlation of 0.20 to all pairs of borrowers. In its November 2001 update, the committee opens the possibility of allowing the sensitivity to this common risk factor to be inversely related to the probability of default. The argument for this is that, for cross-sectional data, as the probability of default rises the importance of idiosyncratic factors appears to rise relative to that of systematic risk, resulting in lower asset correlations.[6]

The operational consequence of this in the committee's latest proposal is to retain a correlation of 0.20 for high-quality borrowers while allowing this to fall to 0.10 for riskier credits with higher default probabilities. It is largely this consideration that leads to the downward revised capital charge as a function of PD in the November 2001 proposal.

The impact of this is to make the Basel II capital charge less pro-cyclical. Whether this approach is empirically justified remains open to debate. In any case, it only mitigates, and does not reverse, the pro-cyclical behaviour of regulatory capital under the proposed Basel II rules. ■

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[1] *Altman E, A Resti and A Sironi, 'The link between default and recovery rates: effects on the procyclicality of regulatory capital ratios', BIS working paper no. 113, July 2002 (available at* www.bis.org*)*

[2] *Both default rates and recovery rates are dollar-weighted averages*

[3] *Recall that regulatory capital is based on the product of exposure at default, PD and LGD. Hence positive covariation between PD and LGD will magnify the impact of pro-cyclical changes in PD*

[4] *Lowe P, 'Credit risk measurement and procyclicality', BIS working paper no. 116, September 2002*

[5] *This is the so-called asymptotic single risk factor approach. See Gordy M, 'A Comparative Anatomy of Credit Risk Models', Journal of Banking and Finance 24, 2000, pages 119–149*

[6] *Lopez J, 'The relationship between average asset correlation, firm probability of default and asset size', paper prepared for a conference, Basel II: an economic assessment, BIS, May 2002*