

Box 12

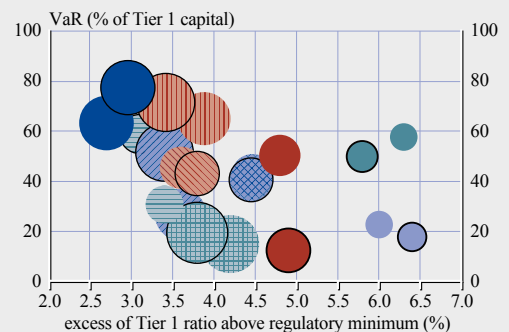
ASSESSING CREDIT RISK IN THE LOAN PORTFOLIOS OF EURO AREA LARGE AND COMPLEX BANKING GROUPS

Recent financial market developments have demonstrated the importance of understanding the underlying risks in the credit portfolios of banks. This box seeks to address the issue of gauging the credit risk facing euro area large and complex banking groups (LCBGs) under different stress scenarios by making use of a measure of portfolio credit risk which draws upon publicly available data and extending the approach to these issues introduced in the June 2007 FSR. A modelling framework that uses publicly available data is particularly useful for central banks without supervisory responsibilities such as the ECB which have no access to supervisory data but which do have mandates to contribute to financial system stability.

In order to estimate a credit value at risk (VaR) model, information on individual banks' credit exposures was collected from euro area LCBGs' annual reports for the years 2005 and 2006. These data include information on individual institutions' credit exposures to various industry segments and to different countries of origin. Another important input for estimating the credit VaR is the probability of default (PD) for each exposure in the credit portfolio, which can be split across the following four broad economic sectors: non-financial corporates, financial institutions, households and the public sector. Except for the latter two sectors, PDs are estimated by taking the median values of Moody's KMV expected default frequencies (EDF) for each industry sector and country over the whole sample period available (1992-2006). These are then mapped to the corresponding exposure data. In the case of the other two sectors, households and the public sector, PD estimates from other studies in this field were used.¹ Finally, information about loss-given-default (LGD) values for each credit exposure is also required. This input variable can be either stochastic, fixed or industry specific. In the estimations reported below, industry-specific LGDs are selected using the results of previous related studies in this field.² The credit VaR for each bank can then be calculated using these inputs and a standard credit portfolio model, in

Chart A Credit Value-at-Risk (VaR) of selected large and complex banking groups in the euro area in 2005 and 2006

(%; maximum, minimum, interquartile distribution and median)



Sources: Individual institutions' financial reports and ECB calculations.

Note: Each colour represents one bank. The circles with black borders represent 2006 figures and without borders 2005 figures. The sizes of the circles are proportional to the size of total risk weighted assets of the respective institutions in 2005 and 2006.

1 See for instance Sveriges Riksbank (2006), "Using External Information to Measure Credit Risk", *Sveriges Riksbank Financial Stability Report*, 2006/1.

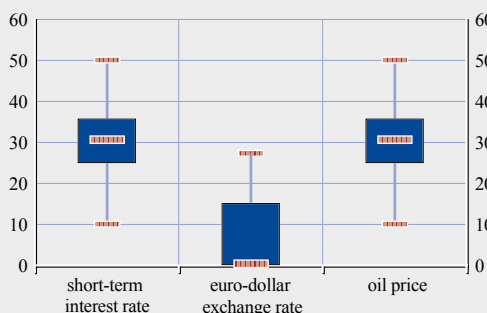
2 Ibid.

this case the CreditRisk+ product developed by Credit Suisse First Boston.

The results show that portfolio credit risk varies across banks and over time, depending on the particular business lines pursued and according to the distribution of geographical and sector loan exposures (see Chart A where the size of the circle is proportional to the size of total risk weighted assets of the respective institution). A comparison of the credit VaR figures between 2005 and 2006, estimated with a 99.9% confidence level, shows that the picture changed for all institutions in the sample. Half of the banks monitored in the sample saw increases in their credit VaRs between 2005 and 2006, two of them more pronounced. The other half of the sample saw decreases in their VaRs, with one LCBG reacting particularly strongly, reflecting a change in its loan exposure. On the other hand, the credit VaR remains less than 100% of Tier 1 assets for all banks (on the vertical axis of the charts). For all banks in the sample, the regulatory capital minimum is exceeded in both years (on the horizontal axis of the charts).

Chart B Distribution of credit Value-at-Risk (VaR) of selected large and complex banking groups in the euro area following different shocks in 2006

(%; maximum, minimum, interquartile distribution and median)



Sources: Individual institutions' financial reports and ECB calculations.
Note: The distributions represent the credit VaR conditional to a shock using loan exposure data for 2006.

To summarise, assuming that the PDs remain consistent with their long-term average values, this sub-sample of LCBGs should not face any solvency problems originating from their credit portfolio risk. A comparison of these figures with the results of the stochastic LGD estimation option did not show any major difference. However, in stress scenarios where it is assumed that the PDs deteriorate from these long-term average levels, the LCBGs' credit VaRs are likely to increase in line with the severity of the scenario.

The linkage between the macroeconomic environment and the VaR in the loan portfolios of euro area LCBGs can be created via a so called satellite equation which links the results of a global vector autoregression model (GVAR),³ that simulates the effects of different macroeconomic shocks, to corporate sector credit quality/default probabilities. The "stressed" PDs can then be used in the credit portfolio model to estimate credit VaRs under stress scenarios. This enables a model based assessment of credit risk in the portfolios of euro area LCBGs under different macroeconomic scenarios and it provides a tool for financial stability scenario analysis.

To illustrate the potential impact of shocks on the credit VaRs of a set of euro area LCBGs, the impulse responses of the GVAR model to two standard deviation shocks to the 3-month money market interest rate of the euro area, the real euro-US dollar exchange rate and the global oil price were calculated. The PDs from these estimations were then fed into the credit portfolio model using end-2006 loan exposure figures. Comparing similar sized shocks in terms of standard deviations, the oil price and the 3-month money market rate have the largest effect on the median credit VaR of the banks in the sample (see Chart B). A shock to the euro-dollar exchange rate produces a more modest reaction for the banks in the sample. These results reflect the sensitivity of banks' loan exposures for the various shocks.

3 See ECB (2007), "Global Macro-Financial Shocks and Corporate Sector Expected Default Frequencies in the Euro Area", *Financial Stability Review*, June.