Introduction to the OR Forum Article: “Design of Risk Weights”

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In this November–December 2014 issue of Operations Research, we have chosen to highlight the paper “Design of Risk Weights” by Paul Glasserman and Wanmo Kang. In this paper, Glasserman and Kang explore a new approach for regulators to set minimum capital levels for banks. The purpose of such capital level constraints is to limit the risk of collapse for large financial institutions if they take large losses in the assets they are holding and thus increase the stability of the financial system. The current regulatory approach is to classify assets held by banks by their risk levels and assign weights to each asset category. The risk weighted sum of the asset holdings of the bank then becomes the basis for setting capital requirements usually as a percentage.

The authors note that capital requirements based on such an approach would inherently change the form of the optimal asset portfolio held by the bank which may have unintended consequences as noted by others. Thus the authors focus on deriving a risk weighting scheme that preserves the portfolios asset mix though reduces risk by scaling the portfolio down. They model the bank as solving a mean-variance portfolio optimization problem (a quadratic program) over a set of asset categories. The regulator is modeled as trying to limit the standard deviation of the bank’s portfolio by setting weights on asset classes and a limit on the weighted asset allocation the bank can choose. The authors show how such a set of weights can be generated that not only achieve the regulator’s goal but maintain the same asset mix proportions as in the bank’s unconstrained portfolio optimization. Interestingly, the optimal weights are proportional to the expected excess returns of the assets but do not directly depend on their riskiness. The asset riskiness comes to the fore in the bank’s objective function.

Given the limited ability of the regulator to know the expected returns of the various asset categories, Glasserman and Kang develop an adaptive control approach. They derive weights in period \( t \) that are based upon the observed asset allocations in period \( t - 1 \). They prove that such an approach will eventually converge with the bank reoptimizing its portfolio until it settles into the optimal one that would have been selected if the regulator knew the expected returns.

We solicited comments on this work from experts on banking regulation. The comments of Jean-Charles Rochet and Darrell Duffie appear online in the OR Forum Blog (http://www.informs.org/Blogs/Operations-Research-Forum). Their comments, together with the paper point to the challenges faced in regulating financial institutions. The paper illustrates an approach to regulation that incorporates the optimizing behavior of the subjects of the regulation, the banks, to avoid causing unintended distortions in their asset mix selection. The adaptive approach is based on an acknowledgement of the regulators limited information and is thus based on the revealed preferences of the banks. The paper effectively draws out the opposing views of commenters who on the one hand (Duffie) believe that the path to better regulation is through more sophistication as in this paper and on the other (Rochet) believe that simplification is better because the regulators can never outsmart the financial industry.