

## **Referee's Report on "Banks, Internal Models, and the Problem of Adverse Selection", by Christian Ewerhart**

In this paper, the author exposit and then builds a model to explain some empirical facts that appear to be surprising, namely that banks seem to overestimate their market risks in their reports to supervisors, which are supposed to be based on their internal risk assessment models. Such behaviour by banks is argued to be very surprising because the resulting need to commit further bank equity capital for such market trading purposes, in order to satisfy prudential safety regulations, is supposed to lead to costly restrictions on these banks' (other) activities, assuming that equity issues are either extremely costly or even infeasible in the short-run. The evidence cited is based primarily on three studies – by the Basel Committee, by Berkowitz and O'Brien, and by Jorion – which note that (i) banks' value-at-risk (VAR) at 1% probability figures exceeded their empirical 99<sup>th</sup> percentile of actual losses by 1.6 to 3 times for 4 out of 6 large US banks, (ii) of a larger sample of 40 banks in 9 countries, in the second half of 1998 nearly half had no ("Exception") days in which their losses exceeded their daily VARs, and (iii) for eight large US banks followed over a longer period (1995-2000) only for two banks were their reported VARs predictive of their income variability over time. The author's calculations of the extremely low chances of these events are predicated on statistical independence across banks, a somewhat implausible assumption during a period of "volatility clustering" and financial crises.

The theoretical model built to explain this sort of bank behaviour is set in the context of bank(er)s with heterogeneous risk tolerances optimising their portfolio choices by mean-variance derived expected utility criteria given an opportunity set that includes a risk-less bond cum borrowing. The equity capital (net worth)  $E$  of each such bank is taken as given. The prudential safety criterion of regulators is taken as ensuring that no bank accumulates trading losses that exceed its equity with a probability more than some fraction  $P$ . This probability is assumed to be sufficiently low such that there is a one-to-one mapping between the level of the VAR at  $P$  and the means and standard deviations of returns of the set of mean-variance efficient portfolios. Left unregulated, some banks would choose asset portfolios whose levels of VAR exceed their equity; a "single-crossing" assumption then ensures that VAR choices would be increasing in bankers' risk tolerances. Thus, a regulator who might be able to observe the bankers' chosen portfolios, and the implied VARs would be able to ensure that those bankers who would have liked to choose VAR above  $E$  choose VAR =  $E$ , and the rest less.

However, when the regulator can not observe portfolios and/or infer the true VARs as above, she may still solicit bankers' reports of their chosen VARs, and attempt to elicit prudent choices by punishing banks (via penalties or higher future equity) for losses exceeding their reported VARs. If such punishments lead to the bank(s) with the highest risk-tolerance choosing a portfolio(s) with VAR equalling their equity  $E$ , then all other banks with lower risk-tolerances will (by single-crossing) choose their portfolios to have VARs (at level  $P$ ) lower than  $E$ . Nevertheless, since equity capital not "committed" under regulation to this market trading activity has no other use, all these banks will report their chosen VARs to also equal  $E$ , in order to minimise their future expected penalties by reducing their expected number of Exception days and expected losses exceeding their reported VAR(s). This is the sole content of Theorem 2, the main result of the paper. It is also not spelt out why the regulator's goal should be to ensure that ALL banks satisfy VAR <  $E$  at  $P$ , if say contagion is what she fears.