

The dangers of a decline in species of risk management systems

As the number of separate and distinct biological species in an area, that area's biodiversity, declines, the risk that the entire ecology could be wiped out by a single adverse event, e.g., weather changes, disease, &c., increases (usually aggressively non-linearly). The same risk is applicable to financial markets because more and more firms use similar risk management tools, and the risk is made worse by firms failing to recognize this.

Suppose that there are a number of competing risk management systems or rather, approaches to risk management, all freely available. It is reasonable to assume that as time passes more and more firms gravitate to the system widely perceived as the best or at any rate the most standard. Additionally, as time passes different systems will tend to converge in methodologies and approaches as they pick up each other's best features. Hence ultimately the vast majority of firms will end up with the very similar systems. In parallel with the adoption of systems will be the adoption of the systems' basic contextual assumptions, for example, normality, techniques for risk summation, &c.

Further, all modern systems require internal inputting of additional assumptions, e.g., degree of asset correlations and covariances, but in general these assumptions are largely driven by historical data, which will be the same for all firms.

Consequently, and for perfectly good internal reasons, each firm's risk management systems will tend closely to resemble any other's, not merely in their analytics, but in the overall position risk assessment. So, an inevitable outcome is that, at least qualitatively, firms will tend to be similarly affected by pathological market events and also by all events outside the existing ambit of the system.

Assuming that the risk systems are very good, having "evolved" by natural market selection, securities firms will be less affected by small disturbances than they previously might have been (which itself may breed a certain complacency). However for a disturbance so great as to perturb the entire financial system, with all firms now (roughly) equally fit, they will all be equivalently affected: there will be no risk biodiversity resulting in differential survival. The effect on the market as a whole will be much more severe than if different approaches had been adopted which would have put some firms out of business though allowing others with different, even possibly inferior, systems, to survive.

(In evolutionary biology, it is well known that perfect adaptation, with concomitant limited genetic diversity is almost always less beneficial long term to a species than a modestly inferior adaptation but with greater diversity. A perfectly adapted species tends to be somewhat less robust to environmental changes. I am, of course, eliding here between species and ecology, but the principle remains.)

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Further risks arise from this decline in biodiversity. Consider a firm setting credit limits. 20 of its financial counterparties are considered to be worth a financial exposure (i.e. risk/replacement value) limit of, say \$100mm, and they are all currently at that limit. If the company assumes no covariance amongst counterparties, a normal if usually implicit or unrecognized assumption, then the total exposure could plausibly be assessed at $\sqrt{20 \times \$100\text{mm}^2}$, \$447mm, and if the company's risk managers had allocated \$1bn. in capital against that credit risk, they may well be regarded as far too conservative.

However, in a world lacking in biodiversity, it may be much more appropriate, nay prudent, to assume high correlations amongst counterparties engaged in the same markets. The real level of exposure may be much closer to the sum of the individual exposures, i.e., \$2bn. and the firm now looks horribly undercapitalized for its true exposure. So the move to similar systems, while it may reduce specific risks, can dramatically increase overall market exposure. And there are obvious feedback effects as well as other firms make the same mistake.

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