

The importance of state-of-the-art risk modelling and measurement or SYNC or SWIM

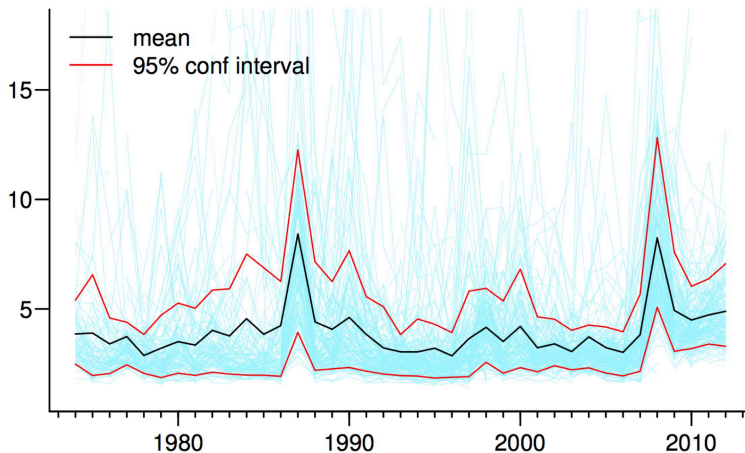
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Lessons from the crisis for central banks – a risk management view
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Diversity of Statistical Methods

Maximal Ratio of highest/lowest VaR using MA, EWMA, GARCH, t-GARCH, HS, EVT



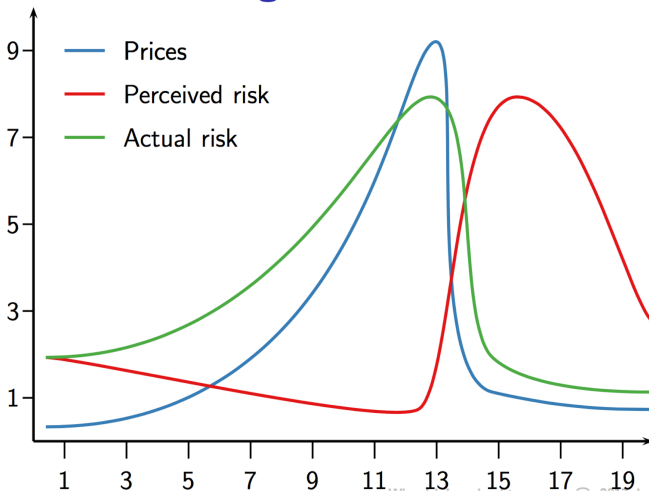
Theme 1: Diversity of Models

- Different players have different (structural & stat) models.
- The same player can have different models:
 - Uncertainty (a.k.a. ambiguity),
 - By design (& changing them or their weights (say in structural stress tests)):
 - Different models & methods designed to focus on different aspects of the financial system by abstracting from others, and they are good at picking up certain types of risk.
 - Wisdom of the crowds: combining different models (possibly of different players) about same aspect of risk shown to be better and robust predictor than any single one.
 - For CB not sufficient to looking at best model among FIs, since models and markets interact.

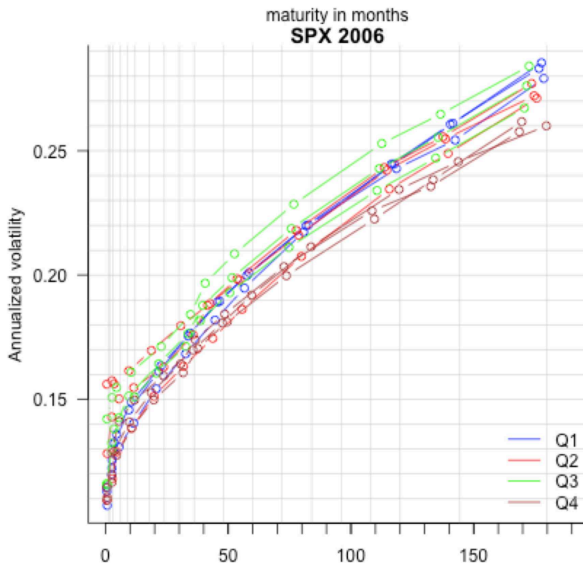
CB needs super-model or super-super-model.

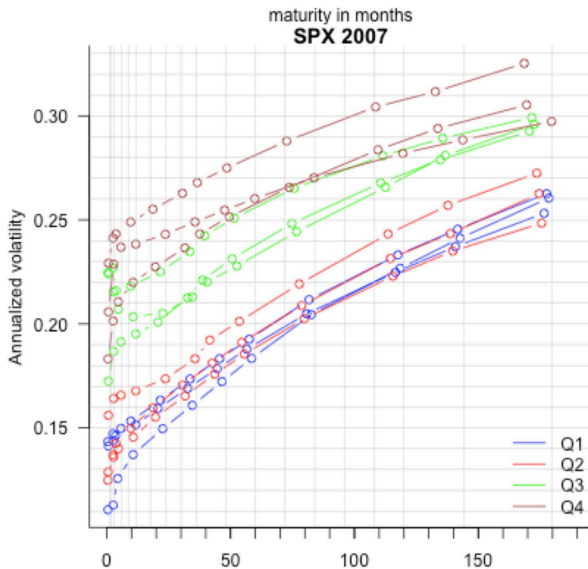
Theme 2: Perceived vs Actual (& short-term vs long-term)

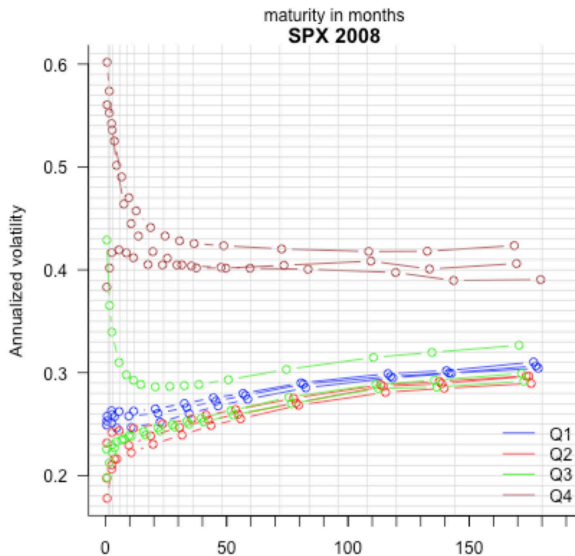
Combine dynamics (build-up / unfolding) of risk with diversity.

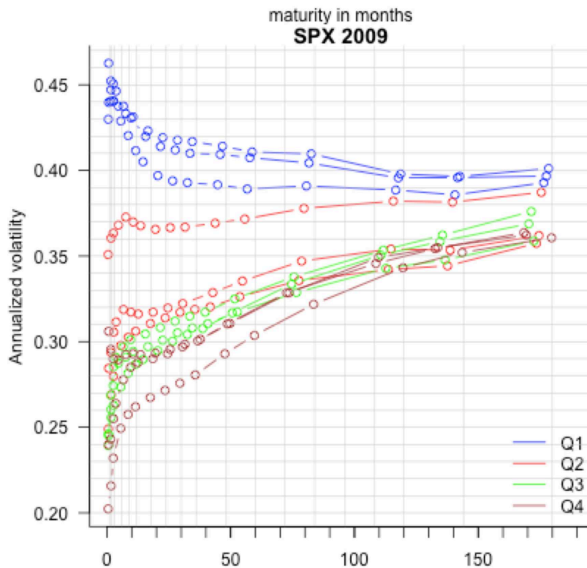


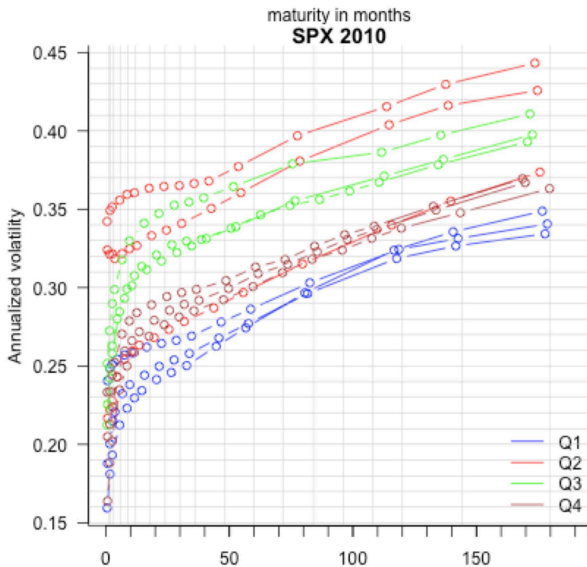
Totem and Term Structures of (Perceived) Risk



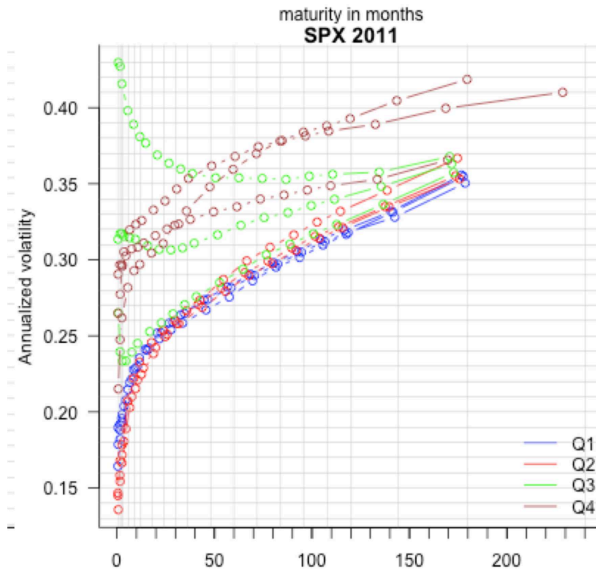








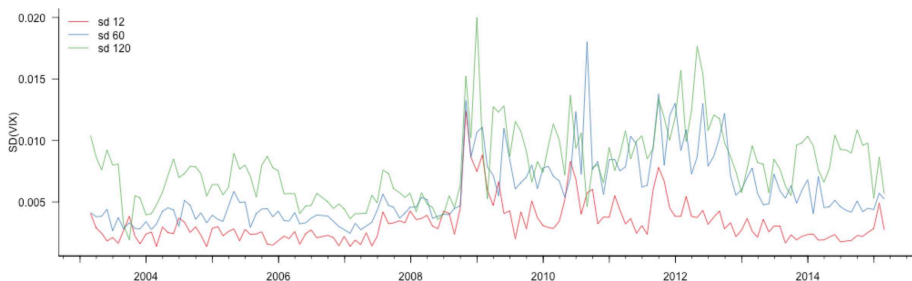
Slope factor w. crossing



Model Diversity & Uncertainty: Totem

Around the consensus curves on previous slides there is a cloud of individual submissions. Here we depict their dispersion (cross-sectional std).

Normalized standard deviations of submitted VIX





Endogenous Diversity and Feedback Loops

- Diversity is not a given, it is endogenous.
 - Structural diversity (Bob May)
 - Risk-model diversity
- A big risk to the system is that diversity collapses and models
 - imperatives for action under stress - synchronise (diversity of action and risk-models; Totem is pricing)
- Examples:
 - Metronomes
 - Millenium Bridge (critical number: 163)
 - Less than 163: more cancelling out;
 - More than 163: rapid non-linear reinforcement, 100% lock-step.
 - Financial Millenium Bridges
 - Thresholds unknowable

Sync and the Millenium Bridge

- Build-up phase:
 - Wobbles would be more pronounced if first pedestrians were more like each other.
 - Relative initial stabilisation of bridge due to diversity.
 - This in turn encourages more traffic (like low *perceived* risk).
 - More pedestrians \Rightarrow building-up of positions \Rightarrow for 162 people bridge looks unassailably stable, yet most vulnerable to violent shaking, *high actual risk* (Minsky's "Stability is destabilizing", "robust yet fragile")
- Unfolding phase:
 - Diversity would dampen
 - But events force sync.
- To conclude: high structural diversity in build up \Rightarrow low perceived risk and allows large build-up of actual risk. In unfolding: diversity really good thing, but forced to sync.

Sync and the Financial Millenium Bridge

- Build-up phase:
 - Normal times: structural diversity is good: idiosyncratic shocks cancel, insurance.
 - Stable environment, structurally diverse players (incl. some crazy ones in sense of May, AIG) \Rightarrow trade.
 - Loop: more synchronised risk-on \Rightarrow low perceived risk \Rightarrow large risk appetite \Rightarrow enabled to put on larger positions.
- Unfolding phase:
 - Risk model synchronisation to *Risk-Off Mode*, “Goodhart Law of Risk Model Diversity”
 - liquidity concerns arising from survival constraints that suddenly bind;
 - VaR and other risk models feed in contemporaneous market volatilities \Rightarrow homogenises regardless of structural model differences (in identical domain of diff. models);
 - worst-case learning and mimicking to save the bacon.

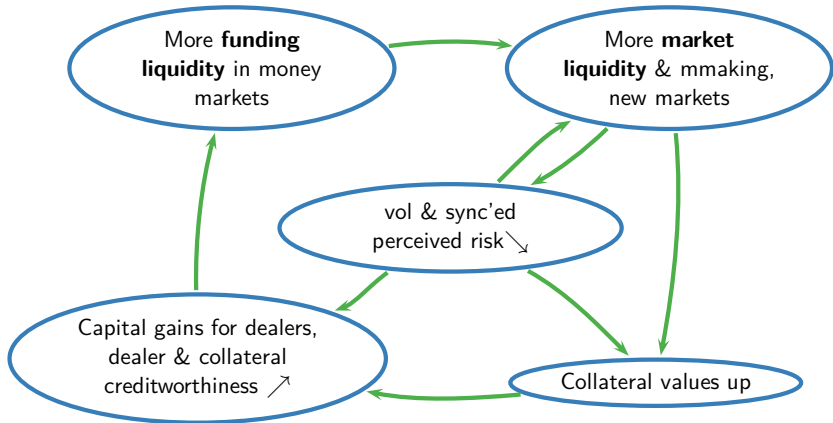


Figure: Build-up of Credit Instability in 2007/8 crisis. Money and Money markets are NOT neutral!

CBs

- Need to have players with dry powder and not subjected to these aligning constraints that make prices act as imperatives of action.
- Risk-taking and market-making get transferred to CB BS.
- But also CB to be aware that some of synchronisation of risk-models and behaviour arises from regulations that bind.

Many thanks for listening to me !