Bullet Points for Day 18

After GARCH? In Comes the GARCH ZOO!

We begin with a celebration of the model with that is AR(1) in "mean" and GARCH(1,1) in "error." It's claim to fame is that it is our first genuinely feasible candidate for an asset return time series model.

The celebration is joyous — but brief. The problem is that the conditional variances of GARCH(1,1) model depend symmetrically on the preceding shocks, while in the real world they do not. One can easily check that for many return series, the down-shocks have more impact on subsequent volatility than the up-shocks.

Naturally, new models have been introduced to deal with this stylistic fact. In fact, so many models have been introduced, we become hungry for reasons for preferring one over another. This leads to a conversation about model selection and the important notion of *fitness for use.*

- Why the model with AR(1) in "mean" and GARCH(1,1) in "error" deserves to be considered as a milestone
- Why it still fails to capture the full richness of reality
- Black's Notion of "Leverage Effect"
    1. Empirically, the effect is real and common
    2. Black's theorized explanation seems deficient
        (a) It doesn't seem big enough to do the job
        (b) It's only an equity story
- The GARCH (really post-GARCH) Zoo — with Animals to Spare
    1. Nelson's EGarch (E for exponential)
    2. The straightforward TGarch (T for threshold)
    3. Then PGarch (P for polynomial)
- Examples of the Fits Using S-Plus (ZW Code)
- Observations from the Examples
    1. We confirm that the "Leverage Effect" is significant
    2. We start to hunger for reasons to prefer one model over another
- How DO we choose from so many models?
    1. Classical methods require "nested" models
    2. *Fitness for Use* is the most honest (and most difficult) criterion