Evaluation of Value-at-Risk Estimation using Long Memory Volatility Models : Evidence from Stock Exchange of Thailand

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Framework of the paper

The paper adresses the topic of Long Memory Variance in financial returns. That's why, models you study are separated into two categories :

- Short Memory models :
  1. GARCH (classical one)
  2. GJR-GARCH (allow for asymmetry)
  3. EGARCH (allow for negative parameters)

- Long Memory models :
  1. IGARCH (for **non stationnary** process, with long memory because of high degree of persistent in volatility)
  2. FIGARCH (for **stationnary** process with long memory)

An interesting paper according to me !

- Very complete study because you use :
  - A wide range of models with different features (short and long memory),
  - 2 types of innovations (Student and Gaussian)
- Interesting results about the use of long memory process for asset returns series :
  - Good ability to forecast Value-at-Risk

1. **About Kupiec VaR backtesting test you consider :**

It exists a huge litterature regarding VaR backtesting tests which are shared into 2 categories :

- **Unconditional coverage tests**
  We test if in average the number of violations matchs well the coverage level α (i.e. if the estimated VaR is centered on the true one)

  Note : Kupiec test you use belongs to this category

- **Conditional coverage tests**
  We test for no violations clustering using independance test of the violations sequence (i.e. if the estimated VaR capture well dynamic of returns)

I advise you to complete your study of VaR accuracy with this very important second test category

To provide a very simple conditional coverage test :

- You can compute a **box pierce test** on the violation sequence to test for autocorrelation :
  - If correlation : Model dynamic is not suitable to have good VaR forecasts,
  - If no correlation : The dynamic of returns is well captured by model.

If you are interested in more sophiticated and more powerfull tests, you can see :


Christoffersen, P. F. (1998), « Evaluating Interval Forceasts », *International Economic Review*, p. 841-862


Christoffersen, P. F., and D. Pelletier (2004), « Backtesting Value-at-Risk : A Duration-Based Approach », 2, 1, p. 84-108 *Journal of Financial Econometrics*

2. **Regarding the standard procedure suggested by Bank of International Settlement you use :**

Table 1 Critical value for classify zone under the BIS criteria at 99% confidence level

Zone	No. of violations
Green	0 – 50
Yellow	51 – 63
Red	64 or more

Note: Critical level calculated based on the sample size of 4,171 observations.

According to this table :

If I observe no violations, conclusion is « good model »

I do not really agree with this conclusion

I'm going to explain that ...

Table 1 Critical value for classify zone under the BIS criteria at 99% confidence level

Zone	No. of violations
Green	0 – 50
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Note: Critical level calculated based on the sample size of 4,171 observations.

Here we have :

- 4171 observations,
- Coverage level is set to 1%,
- It means that the number of violations must be close to $4171 \times 1\% = 41.74$ to have accurate VaR forecasts

0 violation is very far to 41.74 !

I think that this backtesting methodology is not really suitable to check VaR accuracy, you should focus on unconditional coverage and conditional coverage tests which are naturally build to check VaR accuracy

3. **Again about backtesting methodology for VaR forecasts :**

   - You don't mention in the paper your in-sample period (parameters estimation window) and out-of-sample period (violations evaluation window),
   - Differentiation of the two windows is essential in backtesting methodology so as to avoid VaR overfitting forecasts.

Have you distinguished in-sample and out-of-sample period in the Kupiec LR test ?

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Hope it helps ! !