Comments on:

Modelling the Emerging Shapes of Power Price Distributions

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- Usuals features of electricity prices: mean-reverting, volatile, spiky
- But changing shapes of price distribution
  - More competitive markets: stronger links to fossil fuel, less mean reversion
  - More renewable: wind and skewness, solar and intraday spread
- Need for an econometric method which takes into account this changing pattern
- Modelling and forecasting the tails of electricity price distributions is crucial

- Three econometric methods:
- Quantile regressions
- Quantiles can be efficiently estimated with distinct regression
- Fundamental factors in quantile regressions
  - lagged prices
  - fuel prices: Gas prices, coal price, Carbon emission price
  - Demand forecast
  - Reserve margin forecast
  - Price volatility
- They can have a non linear effect on price formation

- A reference benchmark: the Conditional Autoregressive value at risk CAViaR model of Engle and Manganelli (2004)
- VaR: a specific quantile
- Quantiles are modelled as an autoregressive process
- Four different specifications
- No explicit assumption on the distribution is needed
- One difference with quantiles regressions: no exogenous factors are taken into account in the modelling of the VaR

- A third modelling: Fully parametric location-scale models
- A equation for the price expected mean
- A conditional density: Gaussian, Skew Student-t distribution
- A model for the conditional variance: a GARCH(1,1) model
- We can forecast the one-step ahead quantiles from the estimated model

- Comparison of these models in an in/out-of-sample context
- Comparative study on GB data: the evening peak trading period (38) 6:30-7 pm
- In-sample estimation shows
  - Lagged price: significant and consistent with mean-reversion
  - fossil fuels have the expected sign
  - volatility has a negative effect for low price, positive for high prices
  - expected sign for demand forecast (+) and reserve margin (-)
- Worthington and Higgs (2013) use also quantile regression and show the strong impact of the changing mix of wholesale spot electricity prices in Australia

- Out of sample forecasting of the 1%, 5%,10%, 25%, 50%, 75%, 90%, 95% and 99%
- Expanding window/Rolling window
- Several tests to compare the models
  - Unconditional Kupiec coverage test, conditional coverage test
  - Another important criteria: the prediction interval

- Conclusion in favor of the linear fundamental quantile regression models
- In line with Nowotarski and Weron (2013, 2014) conclusions
- Gives the narrowest prediction intervals
- Importance of volatility as an additional explanatory variable + other fundamentals
- Evidence of an change in the data generation process: rolling window gives betters results

Some questions

- GARCH modelling: other distibutions?
- Combining forecast?
- Impact of parameters uncertainty on quantile forecast
- Other Tests of unconditional coverage (Campbell (2007) for a survey)
- Christoffersen and Pelletier (2004) test of independence : the duration between two consecutive hits should have a geometric distribution with a success probability of $\alpha\%$
- Bontemps (2006), Candelon et al. (2011): duration based backtesting test for VaR