Extract of:
Risk-adequate pricing of retail power contracts

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Wholesale vs. Retail Market

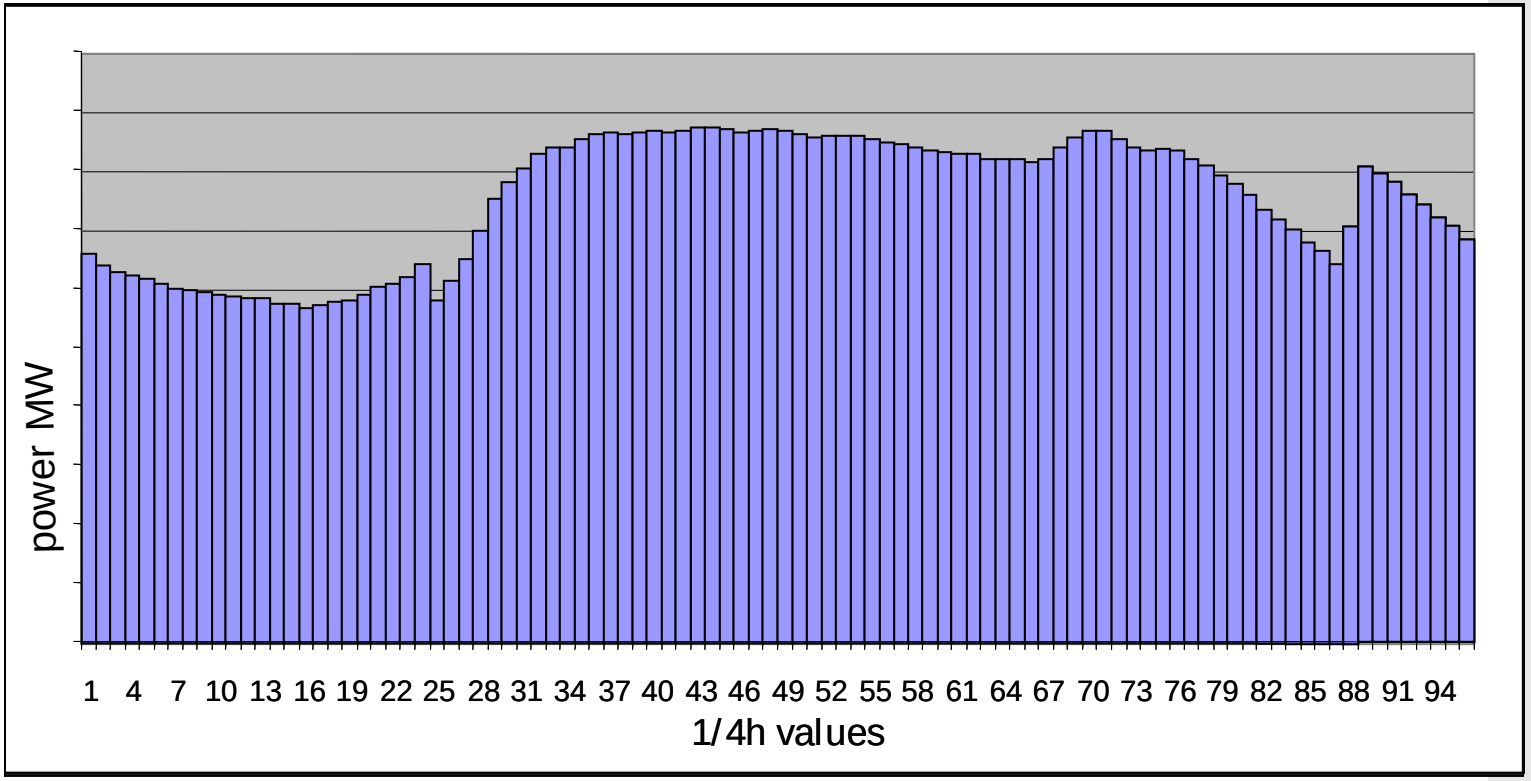
Wholesale Market

- standardised profiles
- in general fixed quantities
- observable prices
- used for sourcing

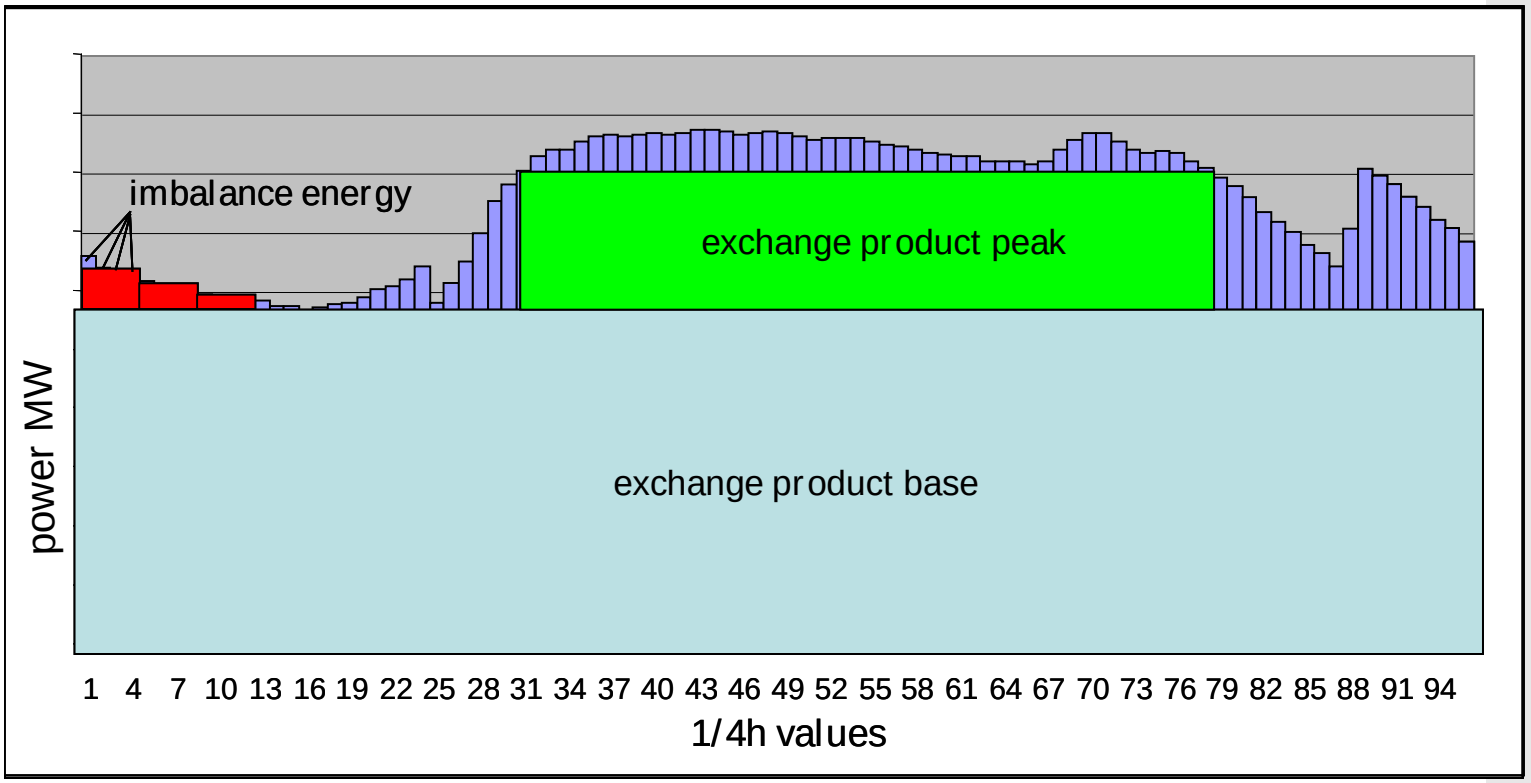
Retail Market

- customised profiles
- quantity depends on consumption
- deduced prices

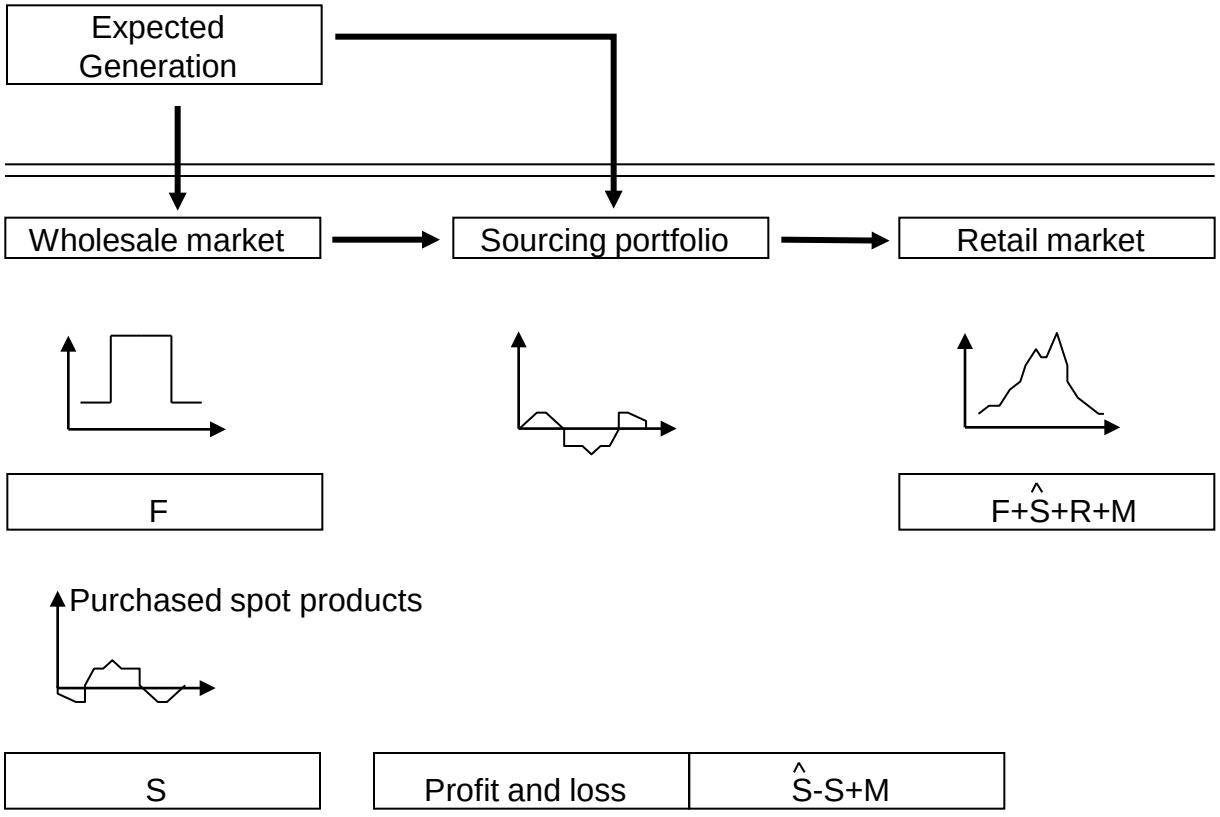
Full Supply Contract: What will be delivered



Sourcing of Retail Contracts

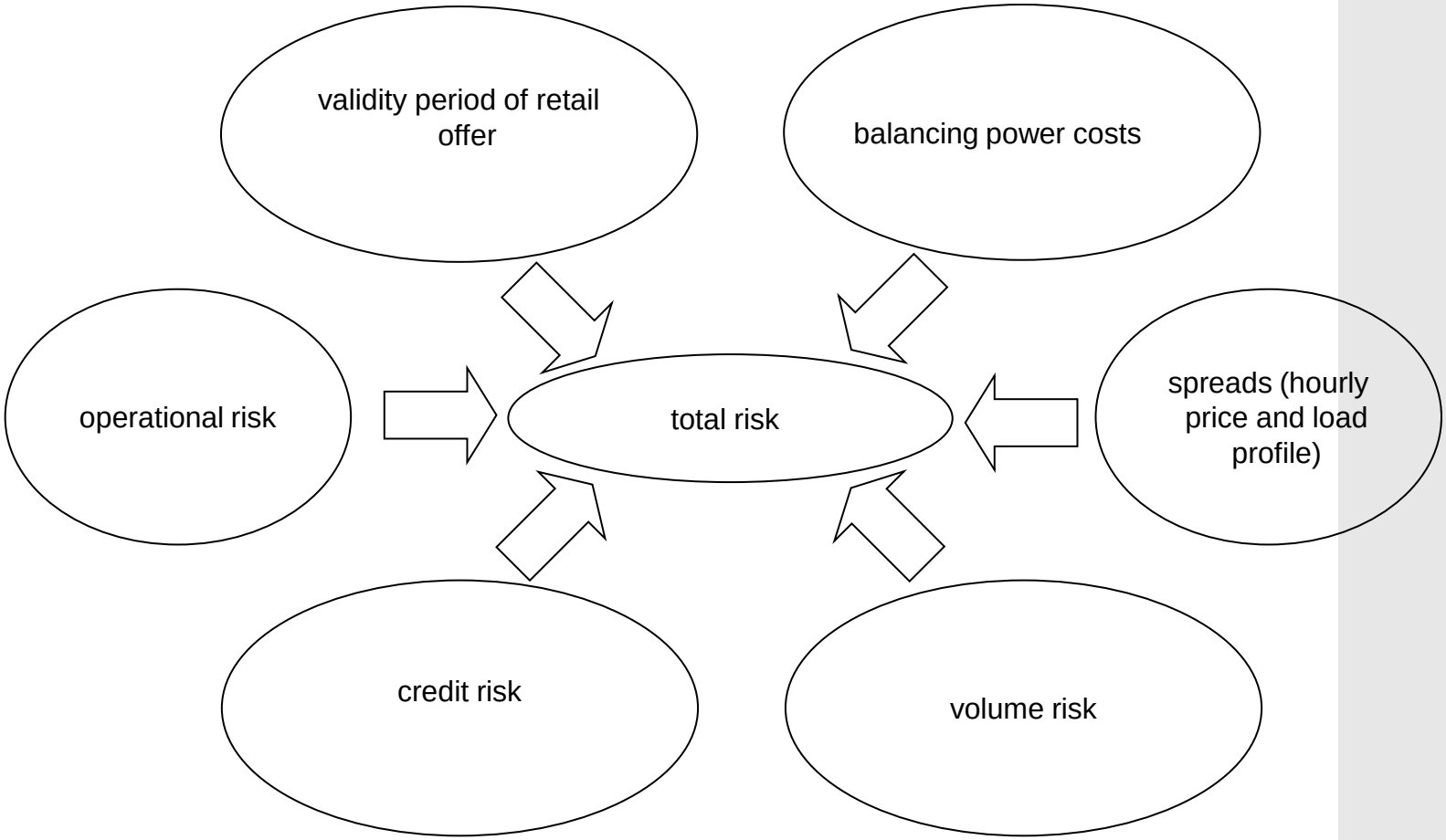


Utility with generation



Risks of Retail Contracts

Contract type: Full Supply Contract



Risk premium

- Risk premiums consist of
  - Expected additional costs
  - Strict risk premiums
- Expected aditional costs covers average costs from contracts on the retail market
- Strict risk premiums cover risk of deviation from the expected loss
- Calculation of strict risk premiums with a risk measure e.g.
  - (Ratio of) standard deviation
  - Risk Adjusted Return on Capital (RAROC)

RAROC approach

- Economic capital
  - Capital allocation for coverage of possible losses
  - Calculation via standard risk measures, e.g. Value-at-Risk
- Hurdle rate
  - Return on economic capital
- RAROC

$$\text{RAROC} = \frac{\text{Expected Return}}{\text{Economic Capital}} \overset{!}{=} \text{Hurdle Rate}$$

- Determination of strict risk premiums so that hurdle rate is exceeded

Risks of Retail Contracts
Expected additional costs

Validity period of retail offer

- Call option free of cost
- Upfront option premium is absolutely unusual
- Risk premium increases strike price

⇨ Minimising validity period

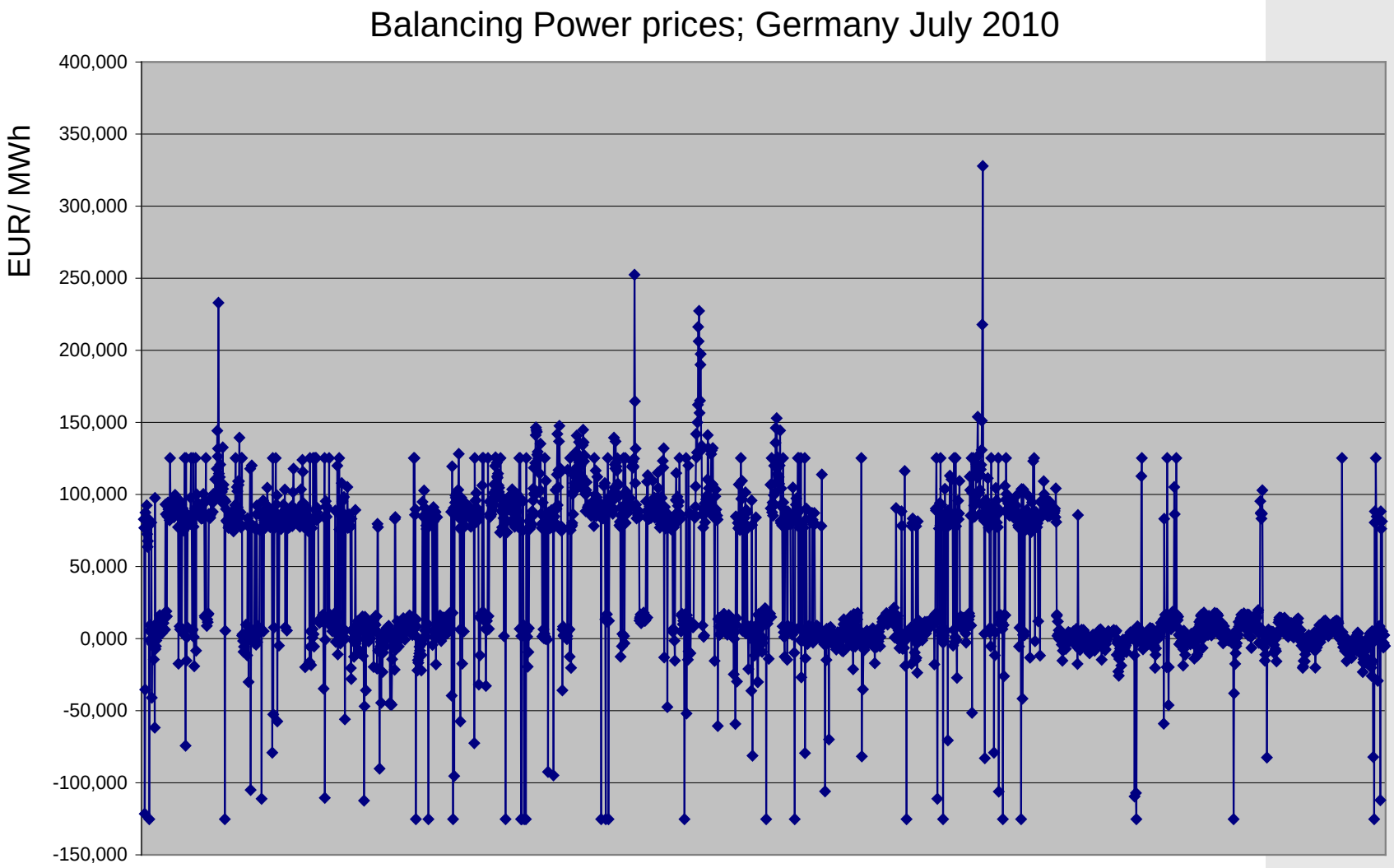
Risks of Retail Contracts
Expected additional costs

Balancing power costs

- Depending from the TSO (Transmission System Operator)
- No strict correlation between spotprices and balancing power (different quality)
- Balancing power prices are published
- Load forecast algorithm for dates in the past can be used for estimate balancing power costs

Risks of Retail Contracts

Balancing Power



Risks of Retail Contracts

Contract type: Full Service Contract

Credit risk

- Credit costs can be estimated using
  - quotes from credit default swaps of the counterpart resp. counterparts with an the same rating
  - calculating the credit Risk and using a RAROC Approach

Risks of Retail Contracts

Contract type: Full Supply Contract

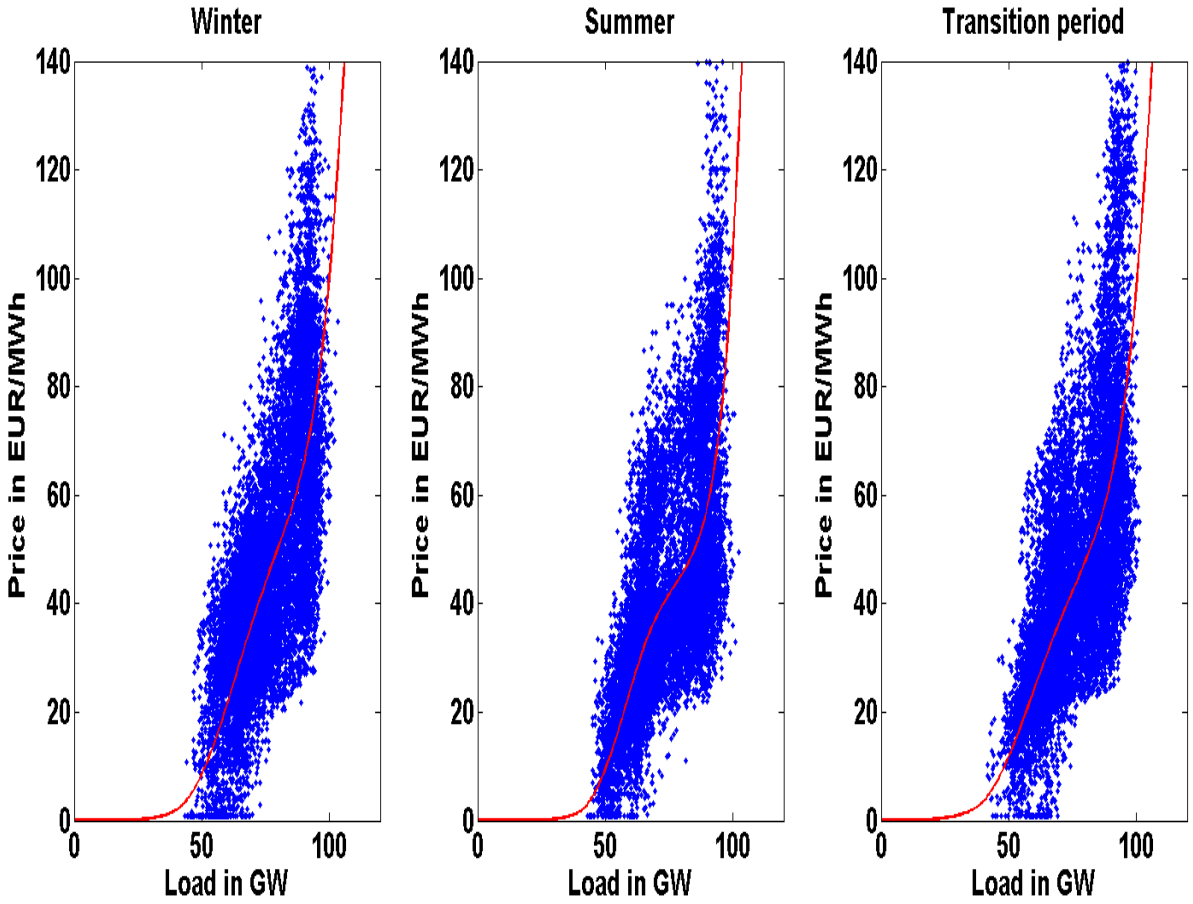
Volume risks

- Most significant risk for retail contracts
  - Induces expected additional costs and strict risks
    - Expected additional costs
      - Caused by the correlation of load and market prices
    - Strict risks
      - Individual divergence of load and load forecast of a customer
  - Calculation of a risk premium demands modelling market prices and load and their correlation

⇨ Risk premium calculation uses a combined price/ load modell e.g. SMaPS

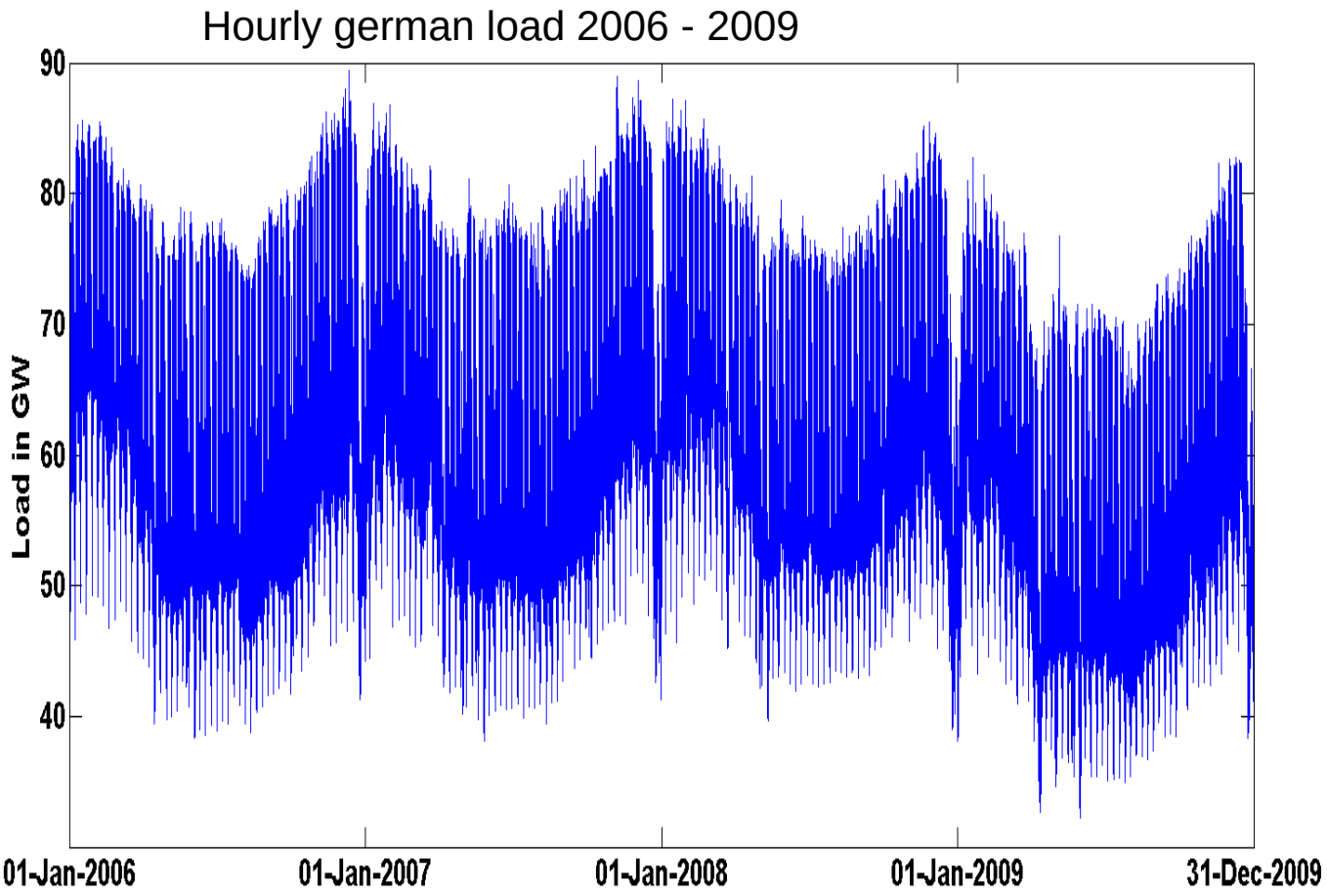
Volume Risk
Price/ load correlation

Merit order curve Germany (load adjusted)



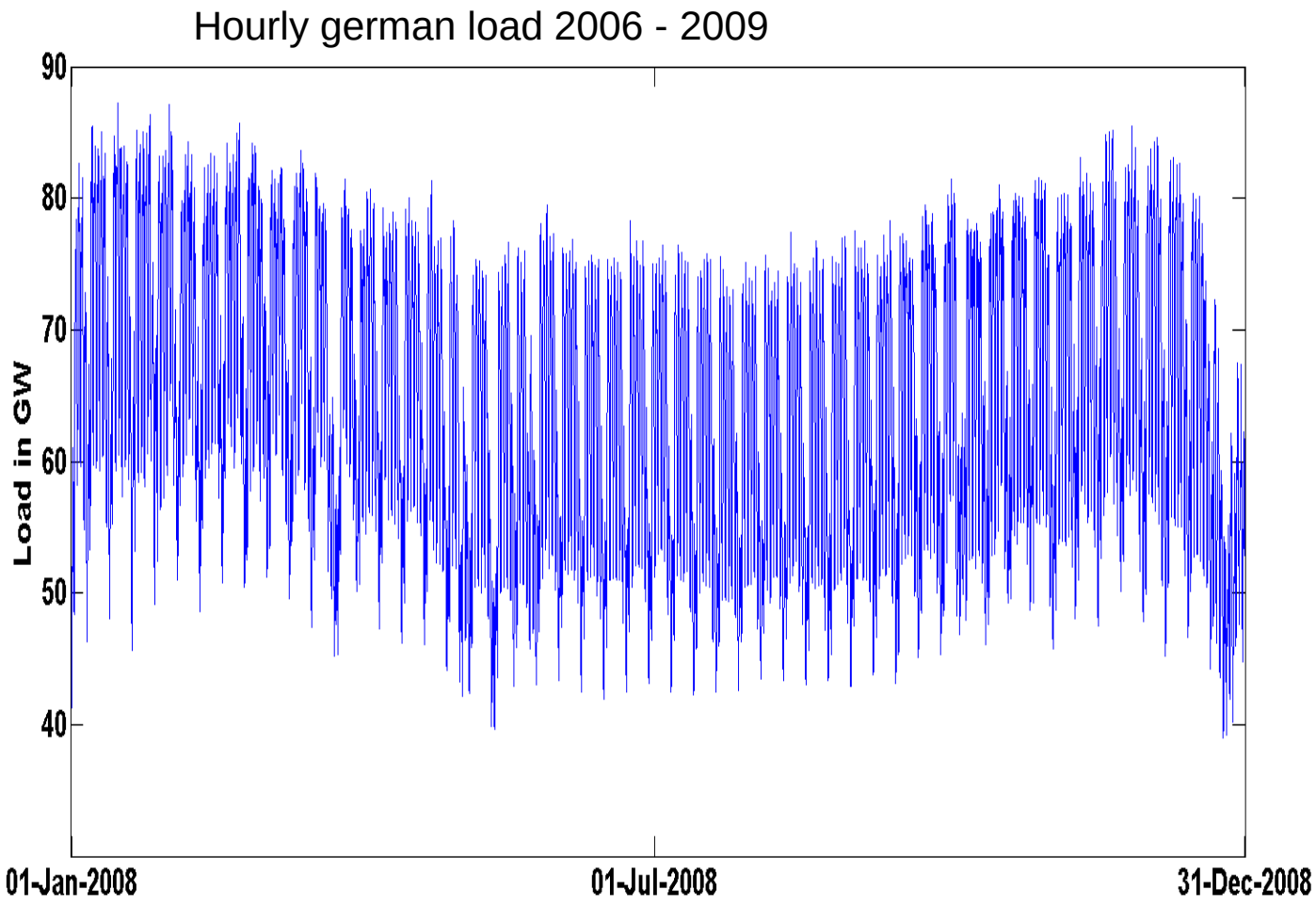
Volume risk

Load in Germany – Yearly saisonality



Volume risk

Load in Germany – weekly saisonality



Volume risk

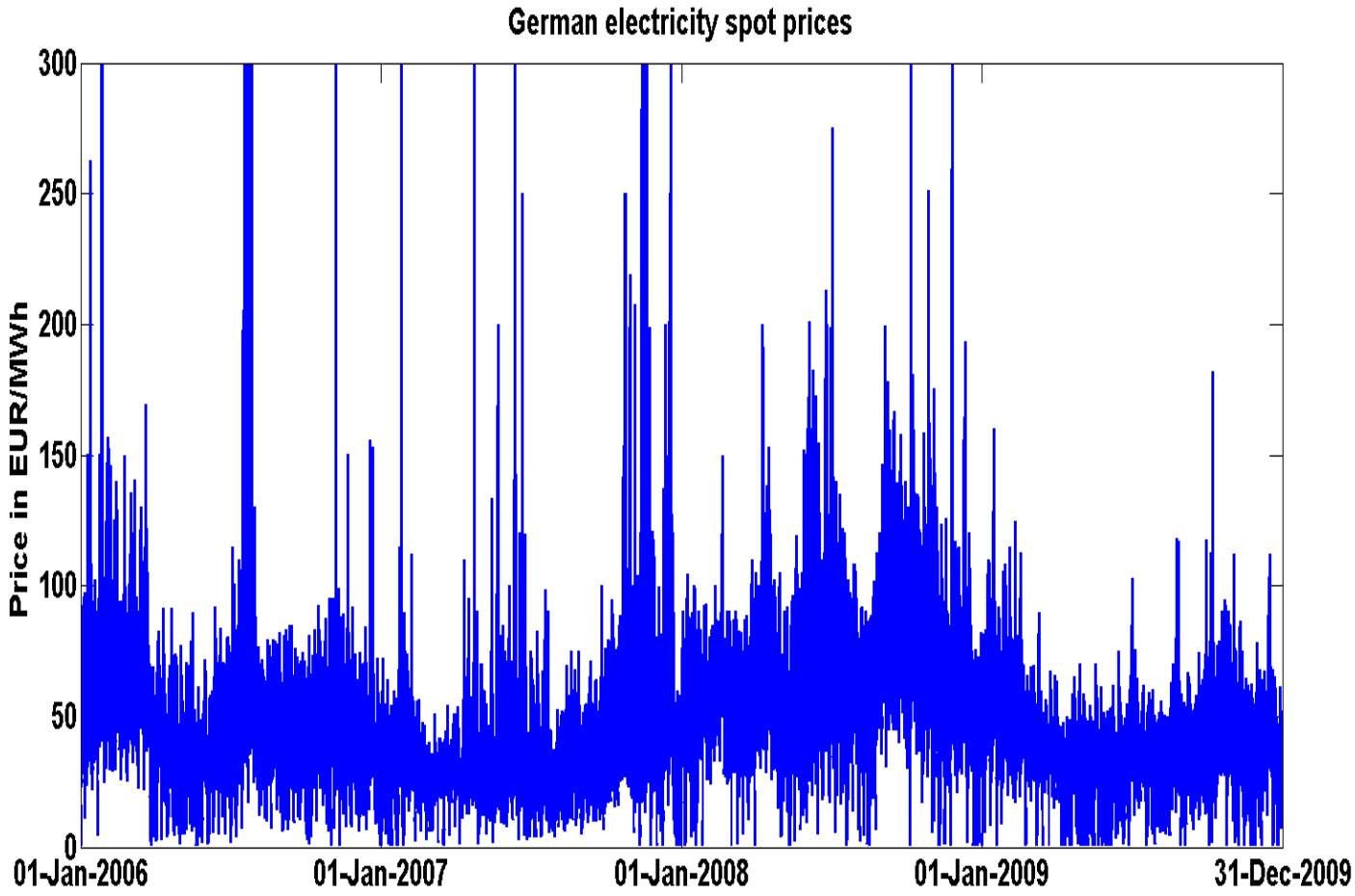
Modelling spot prices in Germany with SMaPS

$$S_t = \exp\left\{ f^{(S)}\left(\frac{L_t}{v_t}\right) + X_t^{(S)} + Y_t^{(S)} \right\}$$

- S_t: Spot price
- f: Merit order curve
- L_t: Load
- v_t: Adjustment by average availability of power plants
- X_t: Short term process (Seasonal ARIMA with NIG-distributed innovations)
- Y_t: Long term process (GBM)

Volume risk

Volume risk cause market price risk



Risk types in retail power contracts

- Classification of risk types

Systematic risk	Unsystematic risk
Price validity period	
Credit risk	Hourly price profile risk (spread)
Price-volume correlation	Individual volume risk (quantity and structure)
Balancing power	

- Systematic risks cause losses (expected loss > 0)
- Unsystematic risks increase probability of losses (expected loss = 0)