Market Power in Electricity Markets - An Approach Using Dynamically Calculated Specific Fixed Cost.

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Abstract

This paper presents a new approach in determining market power and exercise of market power and questions the approach of using plain price deviations to marginal cost as market power indicator in electricity wholesale markets.

Assuming linear, non-convex models of power plants cost ($C = a \cdot Q + b$) and inelastic, varying demand, fixed cost (b) can never be completely covered by marginal cost (a) bidding as this would be possible in cost models with convex shape (fig. 1). Starting with the microeconomic equilibrium $\frac{dC}{dQ} = \frac{C}{Q}$ for the individual break even point of any individual power plant, it will be shown that unfair exercise of market power in heterogenous power plant parks can not be measured by the price deviation to marginal cost but rather as deviation to dynamically calculated average cost. These dynamic, hourly average cost depend on the variance of the demand, the technically required power plants, the pricing mechanism and the expected full load hours of any individual plant (fig. 2).

Using the German power plants, highly varying demand and uniform pricing, simulation results using EMSIM show, that for base load hours the fair market price can be lower than the marginal cost and in turn much higher than marginal cost for high demand hours.

Key words: fair market price; `https://ensys.fk3.tu-berlin.de/emsim`
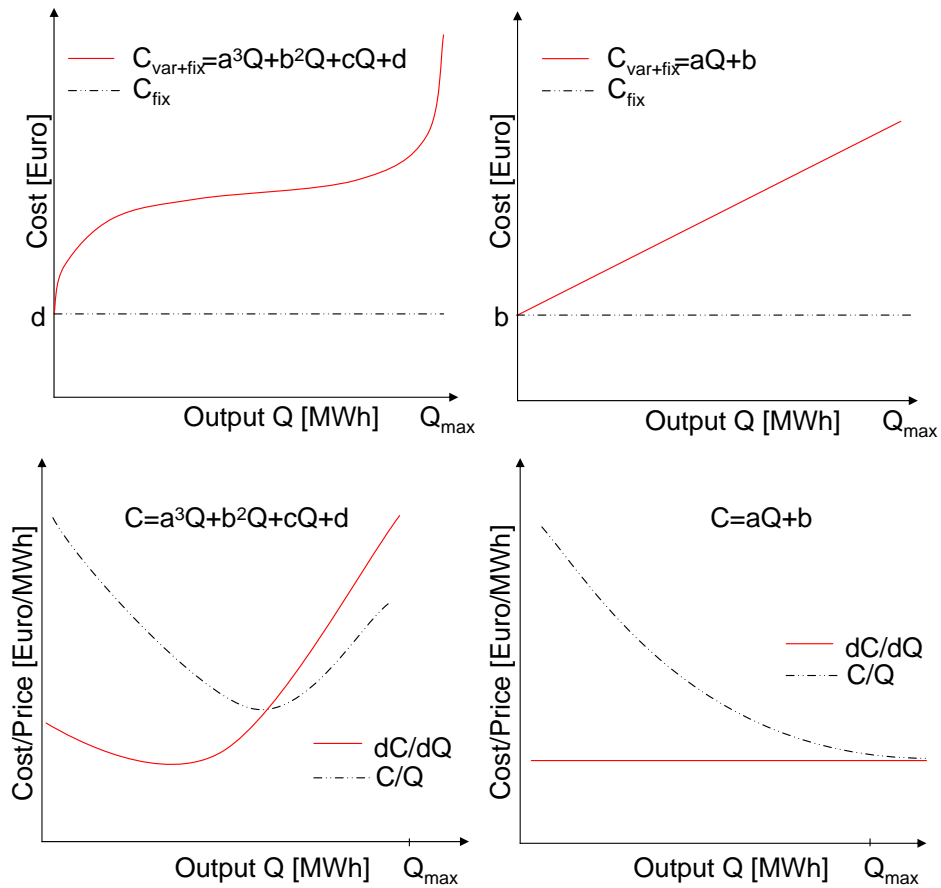
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Fig. 1. When using convex cost models (left) marginal cost can be greater than average cost and thus the break even point can be reached for quantities $Q \leq Q_{max}$. When applying linear cost models (right) marginal cost are always smaller than average cost and thus exclusively bidding/acceptance to marginal cost can never gain profit.

1 Introduction and Targets

2 Applied methods and approach

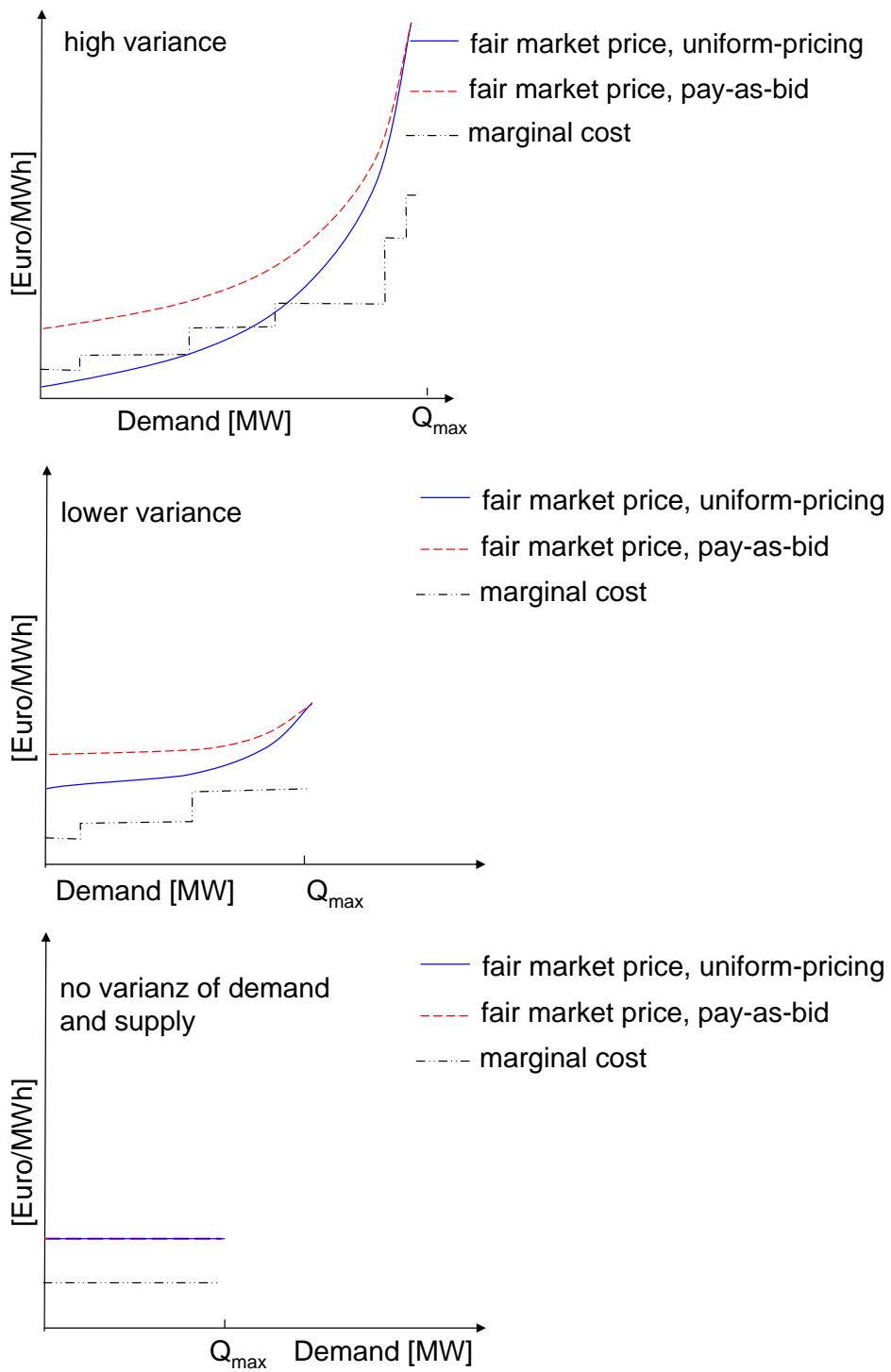# 3 Results

4 Conclusion and Discussion

References

Fig. 2. Depending on the variance of demand and supply, the technically required power plants to satisfy inelastic demand and the pricing mechanism, the "fair market price" can be as well above and below marginal cost. Simulations where conducted using EMSIM.