



The Long-Term Merit Order Effect of Renewable Electricity

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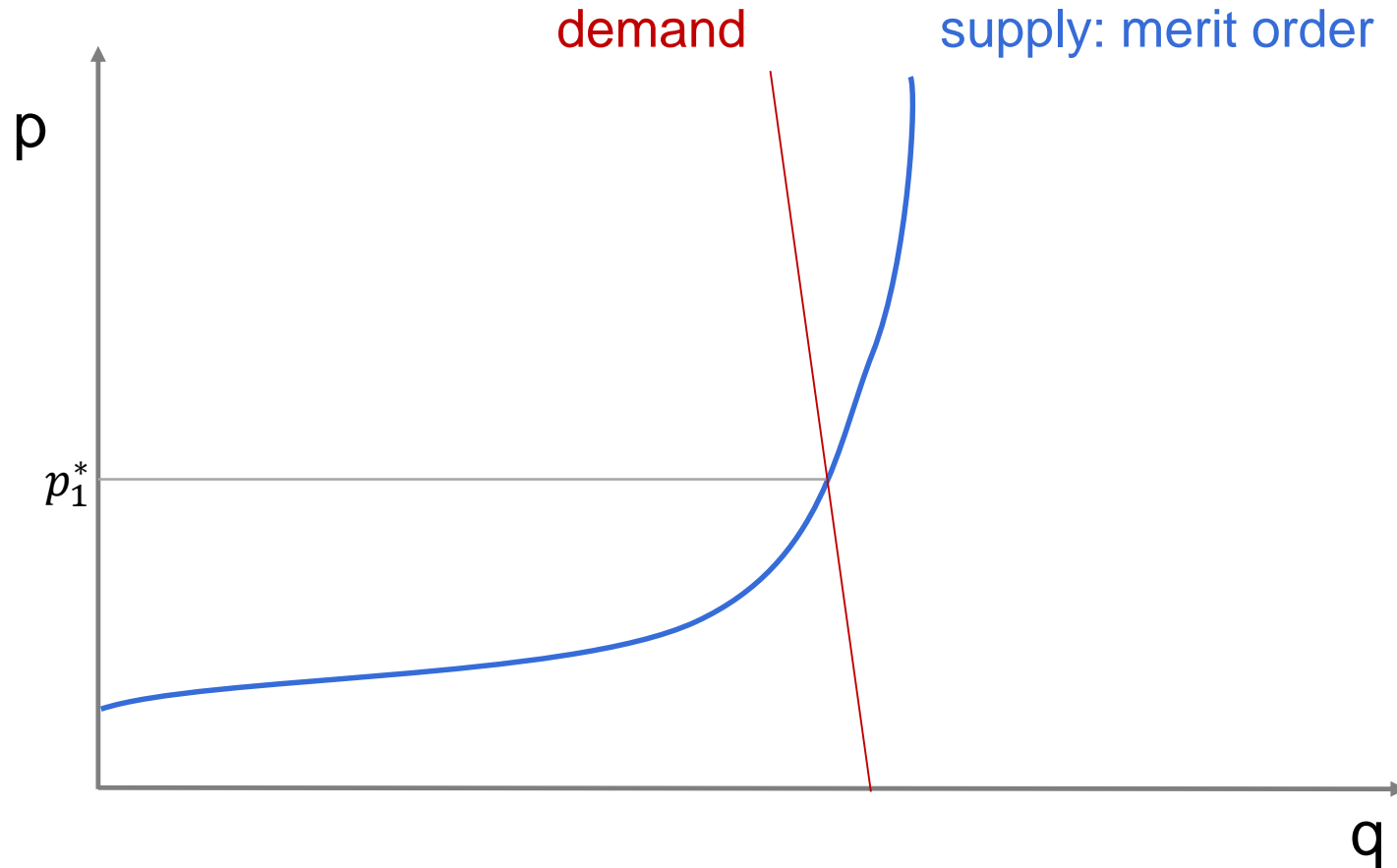
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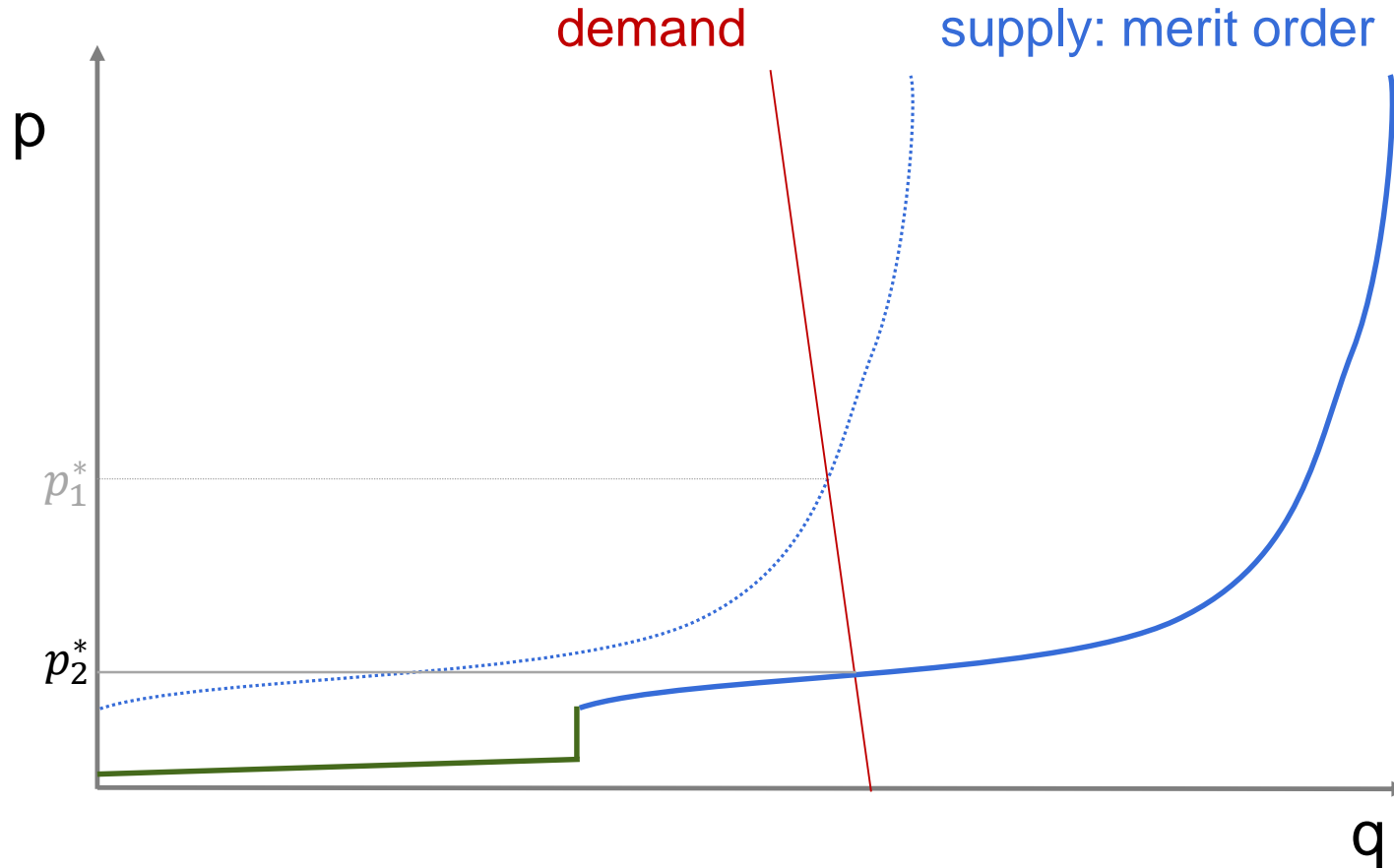
The Merit-Order Effect ...

- ◆ ... measures how wholesale electricity prices are influenced by feed-in from intermittent renewable electricity generators.
- ◆ ... is quantified in more than 20 scientific papers.
- ◆ ... regards an important policy question (“co-benefit” of renewables for consumers).
- ◆ ... regards an important business question (prices and price structures are highly relevant for investment decisions on the supply and demand side).
- ◆ ... is controversially debated (between >10 and 0 €/MWh)
- ◆ An analysis of the literature reveals that an analysis in a general framework is lacking.

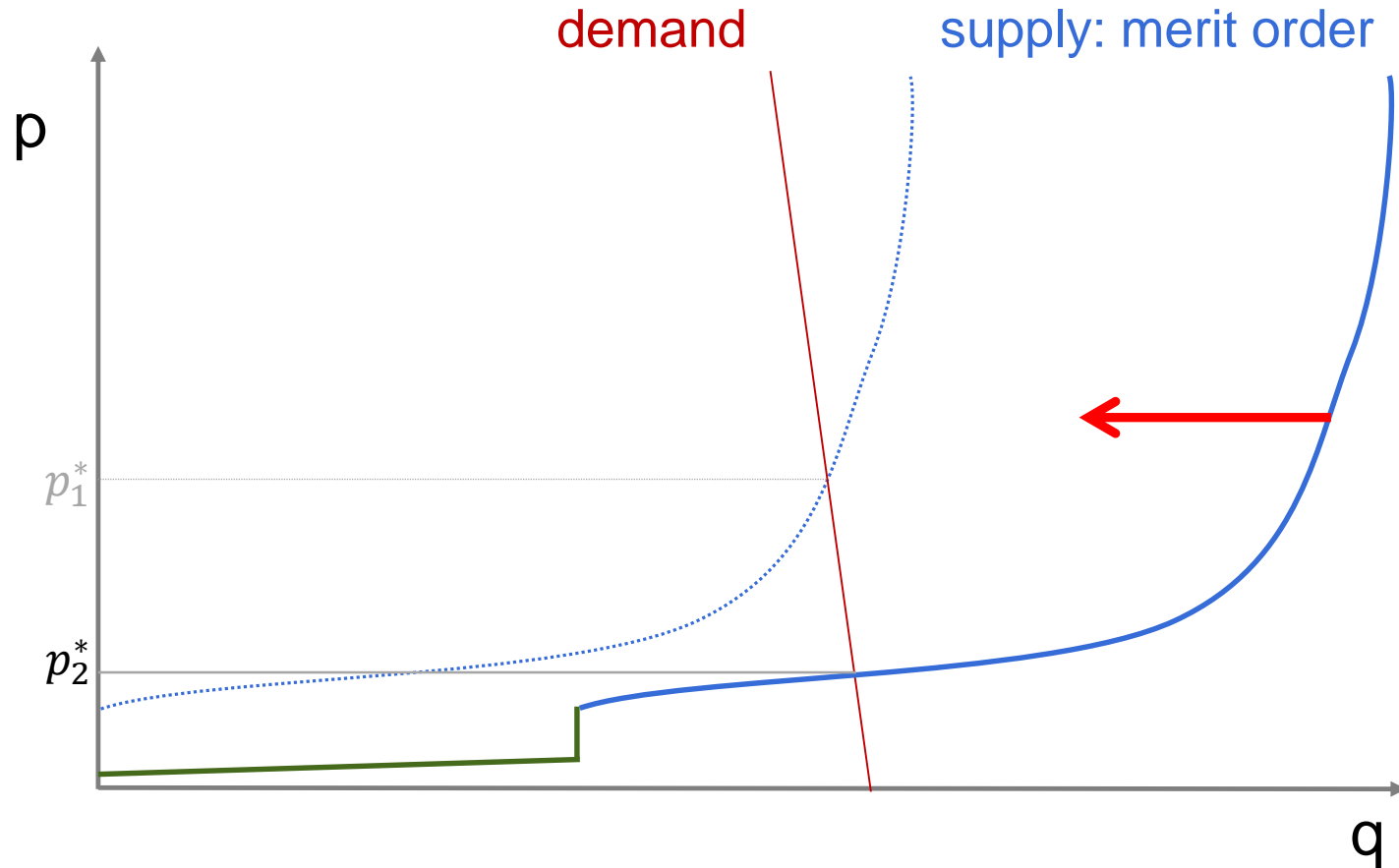
Phase 1: No Renewable Generation



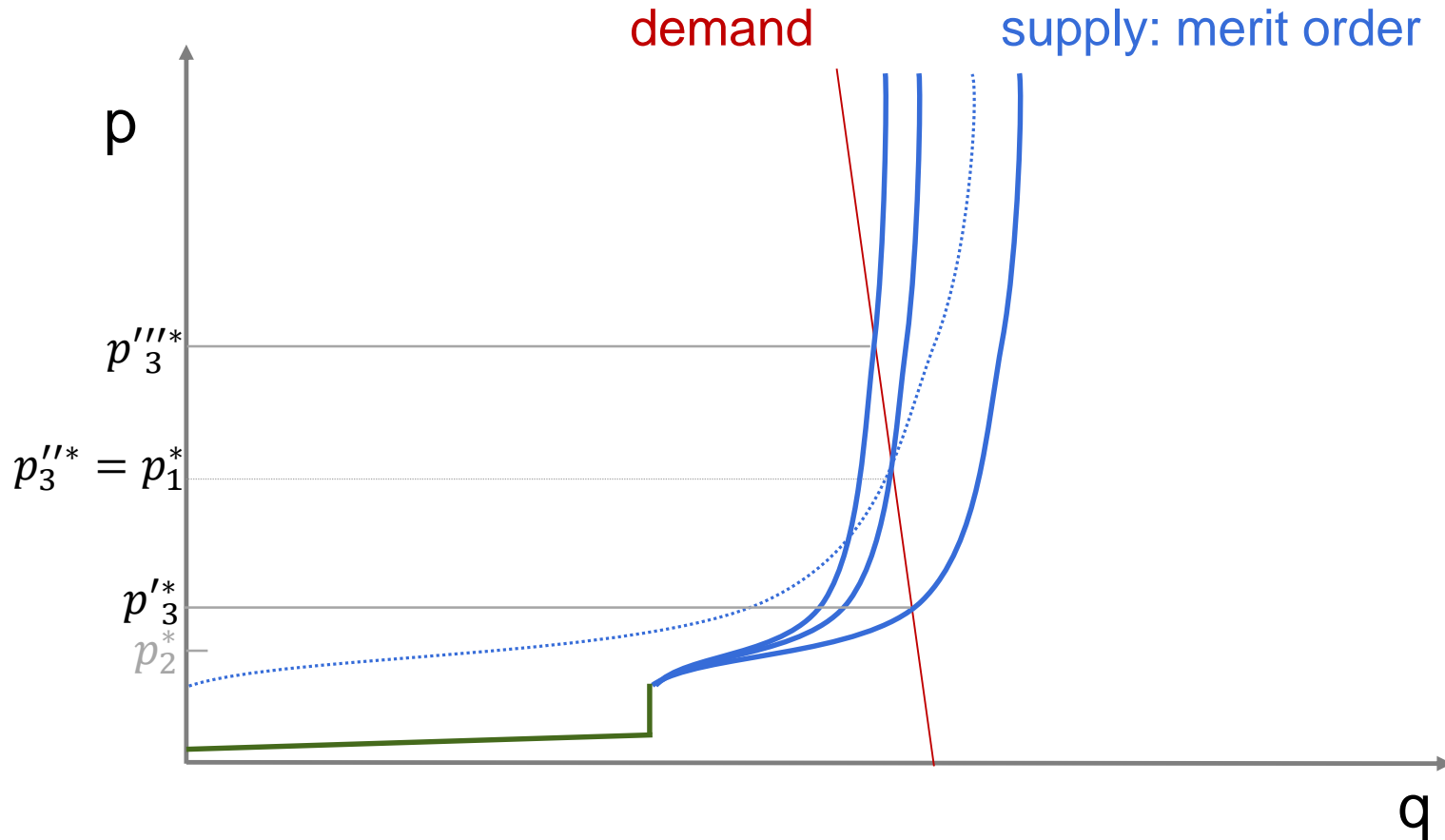
Phase 2: Renewable Generation is Added



Phase 3: Conventional System Adjusts



Phase 3: Conventional System Adjusts



Research Question and Methodology

Research question(s):

What will happen in a medium/long-term equilibrium, i.e. in a system with high shares of renewables, after adjustment from conventional suppliers (phase 3) ...

- ◆ ... to the average wholesale electricity price?
- ◆ ... to price volatility?

Methodology:

Use stylized market models under different assumptions and derive analytical results.

Results:

In an „economic baseline“ (perfect competition, perfect foresight, identical costs between phase 1 and 3, ...) we can prove identical average prices in phase 1 and phase 3. Under these assumptions, the long-term merit-order effect is zero.



Thank you very much!
Questions?

Intermittent Renewables and Price Volatility

- ◆ Wozabal et al. (2014, p. 1): „The dominating view in the literature is that renewable electricity production increases the price variance on spot markets for electricity.“
- ◆ Eurelectric (2010, p. 16): „Short term price volatility will increase as a consequence of higher penetration of intermittent RES.“
- ◆ Cailliau et al. (2010, p. 55) „Thus, short-term price volatility will increase.“
- ◆ Milstein and Tishler (2011) imply that price volatility increases with intermittent renewables.
- ◆ However, the results are ambiguous, other papers come to different conclusions.