NETA and Electricity Prices

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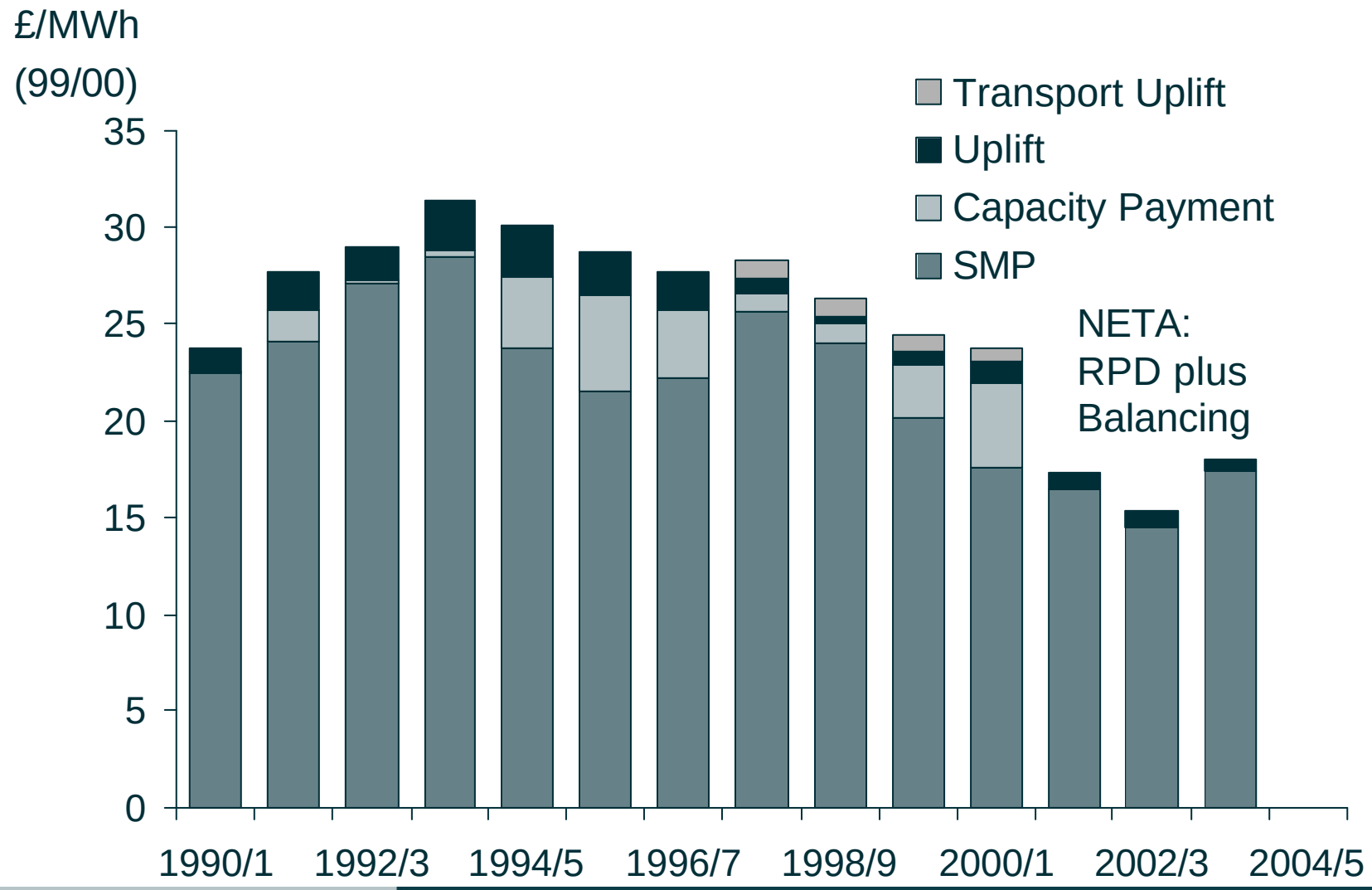
Outline

- The big picture
- Price-setting under NETA
- Price patterns 1996-2004
- Model-based exploration

E&W Electricity Prices



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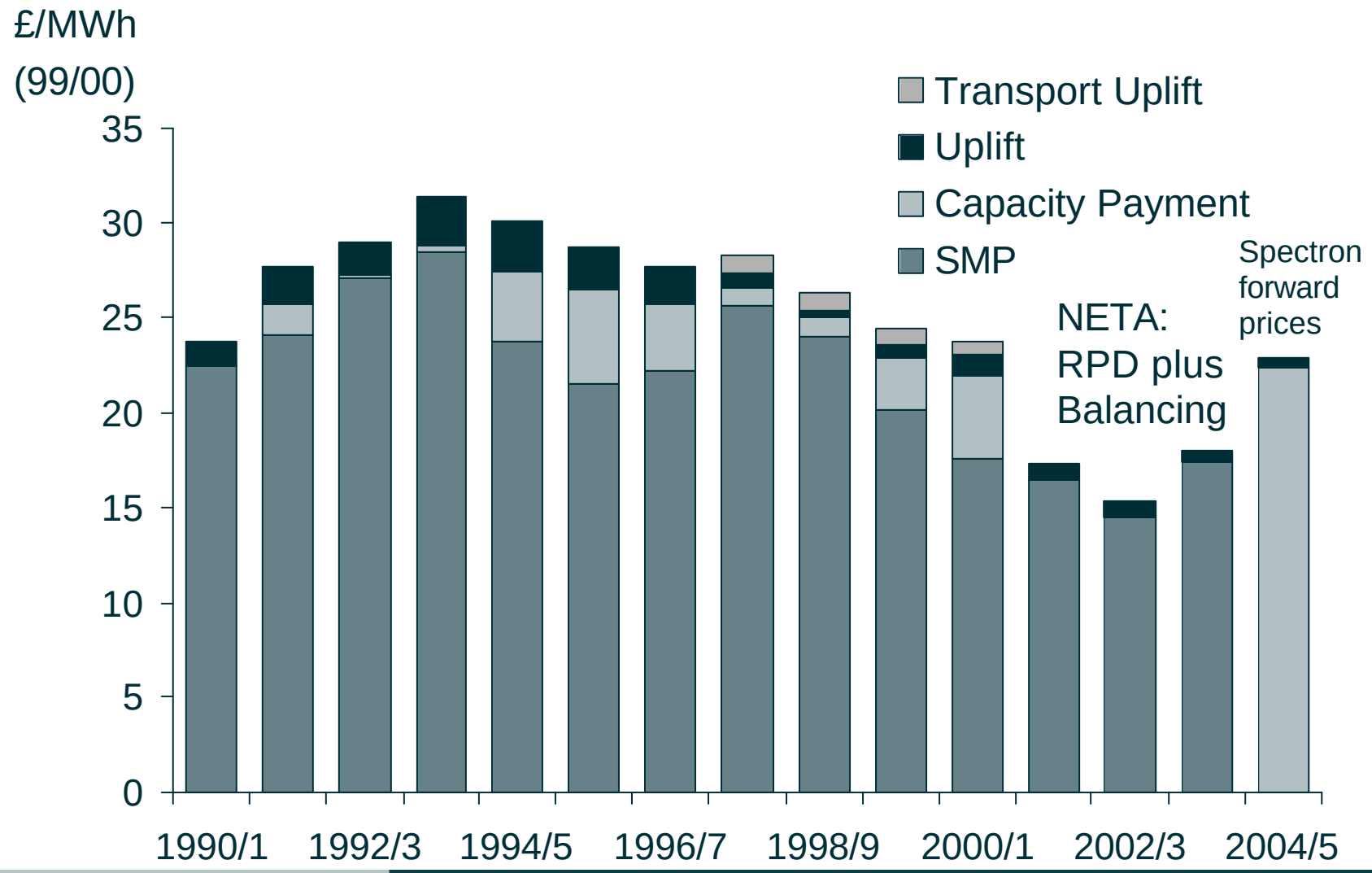


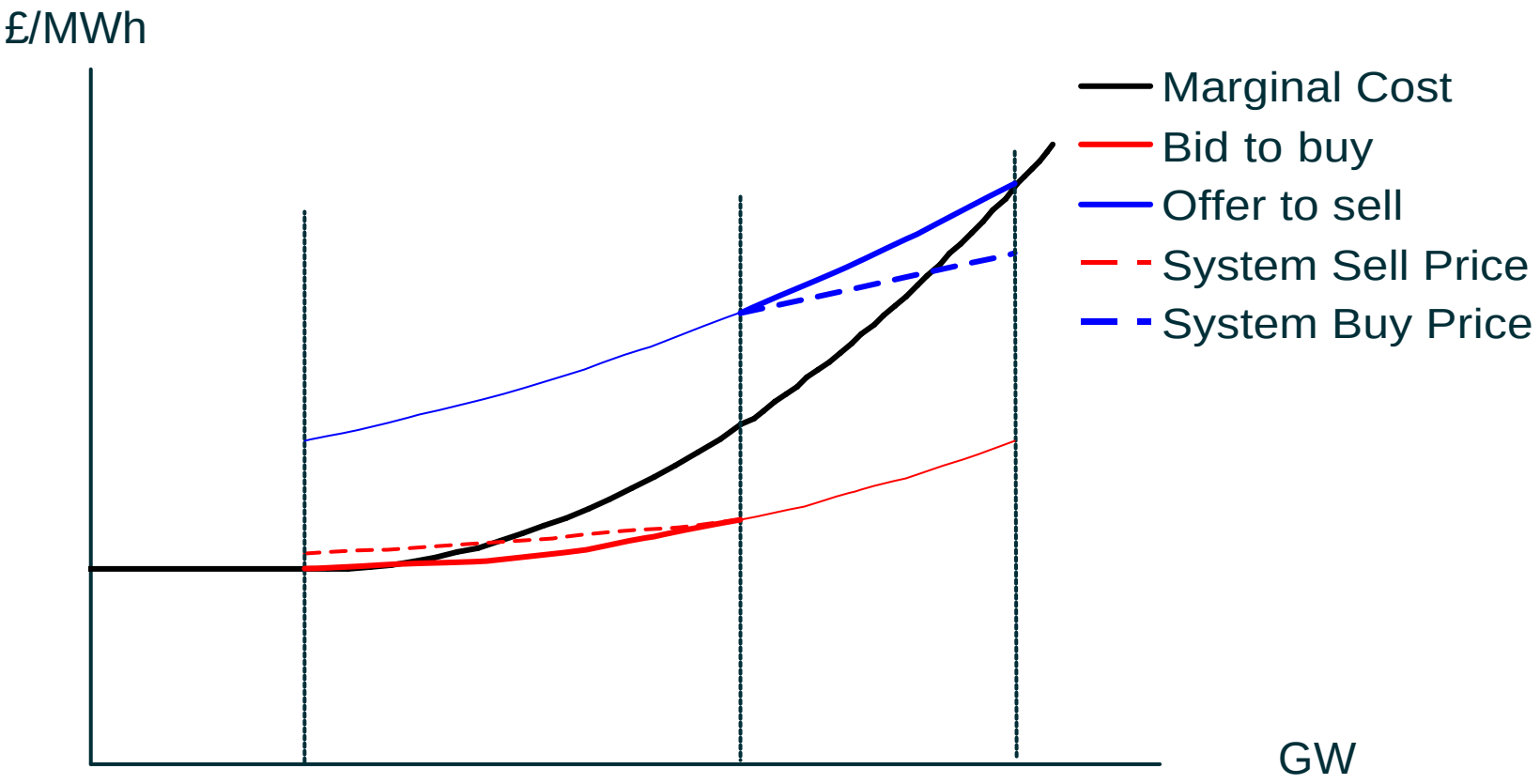
Should NETA reduce prices?

- Pay-as-bid versus marginal pricing
- Dampens down the highest prices
- How will generators bid?
  - (developed from joint work with Tanga McDaniel)

Bids in the Balancing Mechanism

- The highest-cost seller with a chance of being needed bids at marginal cost
  - > Assuming there are others with still higher costs
- Other sellers bid above marginal cost
- The lowest-cost buyer with a chance of being needed bids at marginal cost
  - > Assuming there are others with still lower costs
- Other buyers bid below marginal cost

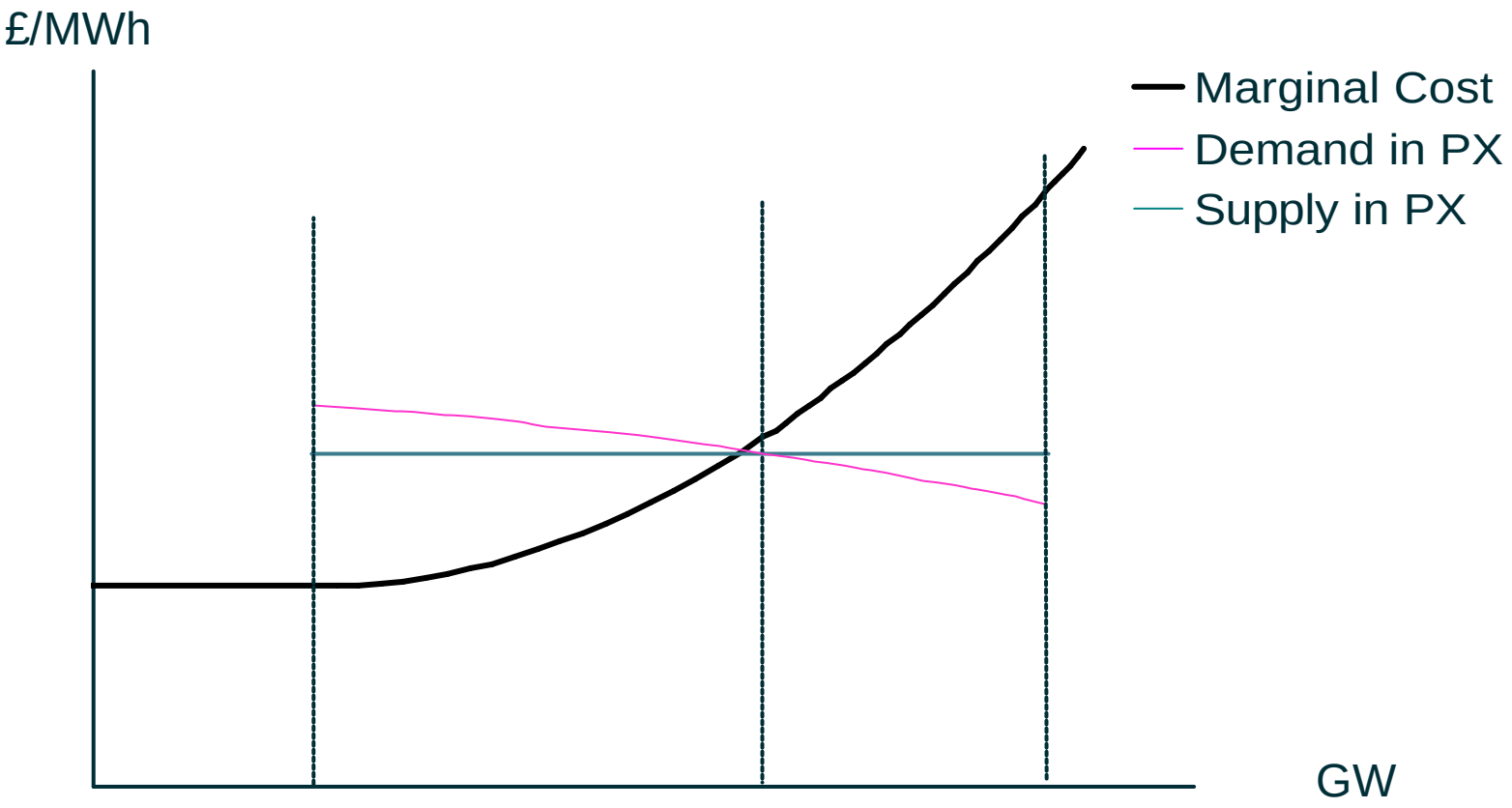
The Balancing Mechanism



Where should they trade?

- Generators trade off the chance of selling at a high price in the BM against selling in the PX and perhaps buying back their output cheaply
- Suppliers trade off the chance of having to buy at SBP rather than the PX price, against losing (PX-SSP) if they buy too much
- This gives demand and supply curves in the day-ahead markets

The Balancing Mechanism



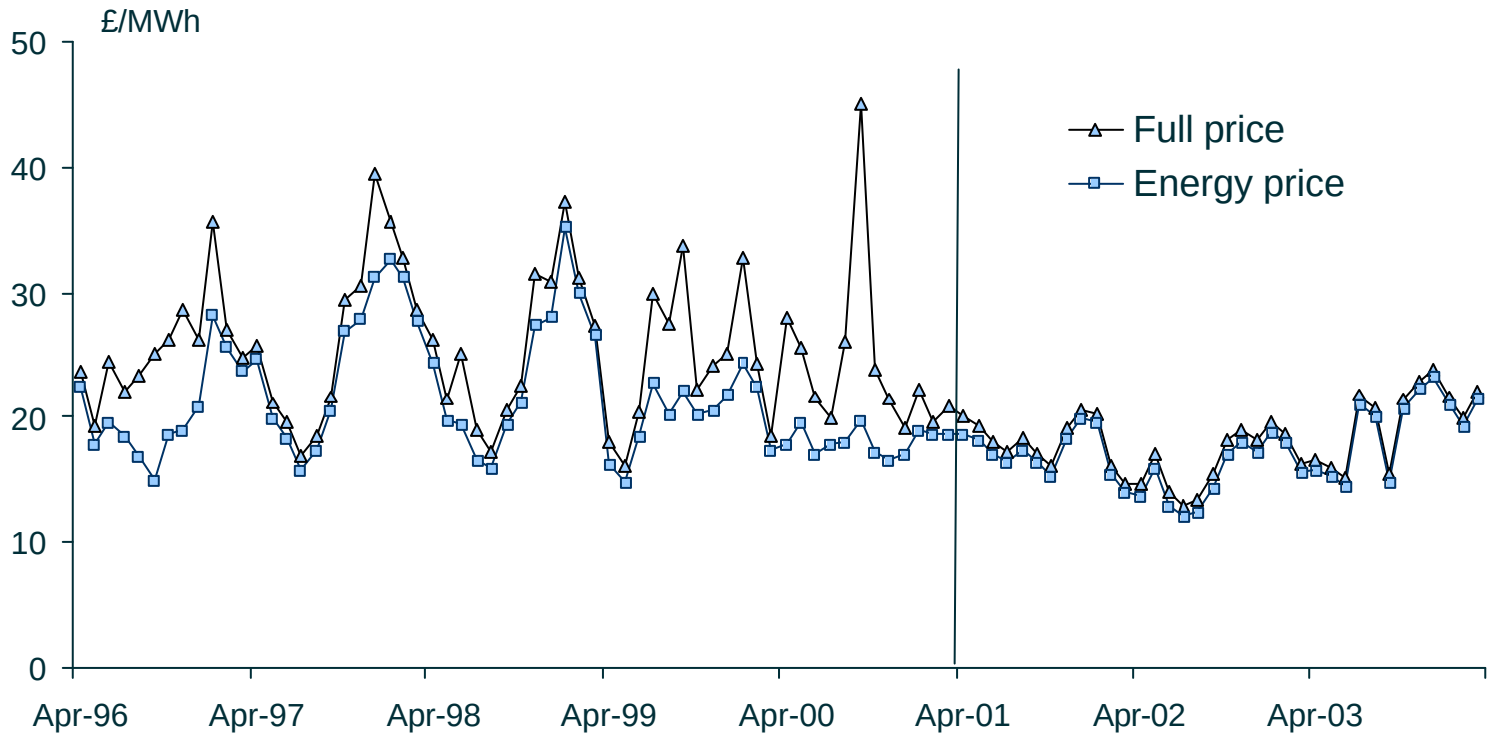
Theoretical conclusion

- Generators expect to get the same under pay-as-bid and marginal pricing
- The PX price is the expected marginal cost of generation (or demand-side bidding)
- Suppliers' payments will be less volatile with pay-as-bid than marginal pricing

Implications

- Demand-weighted price unchanged
- Time-weighted price higher under NETA!
- But this analysis assumes:
  - No risk aversion
  - No market power
- We need to look at the data

Prices



Price series from April 2001 onwards are derived from the UKPX Reference Price Data
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Research strategy

- Many things were changing as NETA was introduced
  - > Market structure (plant divestitures)
  - > Fuel prices
  - > Ratio of demand to capacity was falling
- Model how these would affect prices for a fixed set of market rules
- Does the relationship between the prediction and the actual data change with NETA?

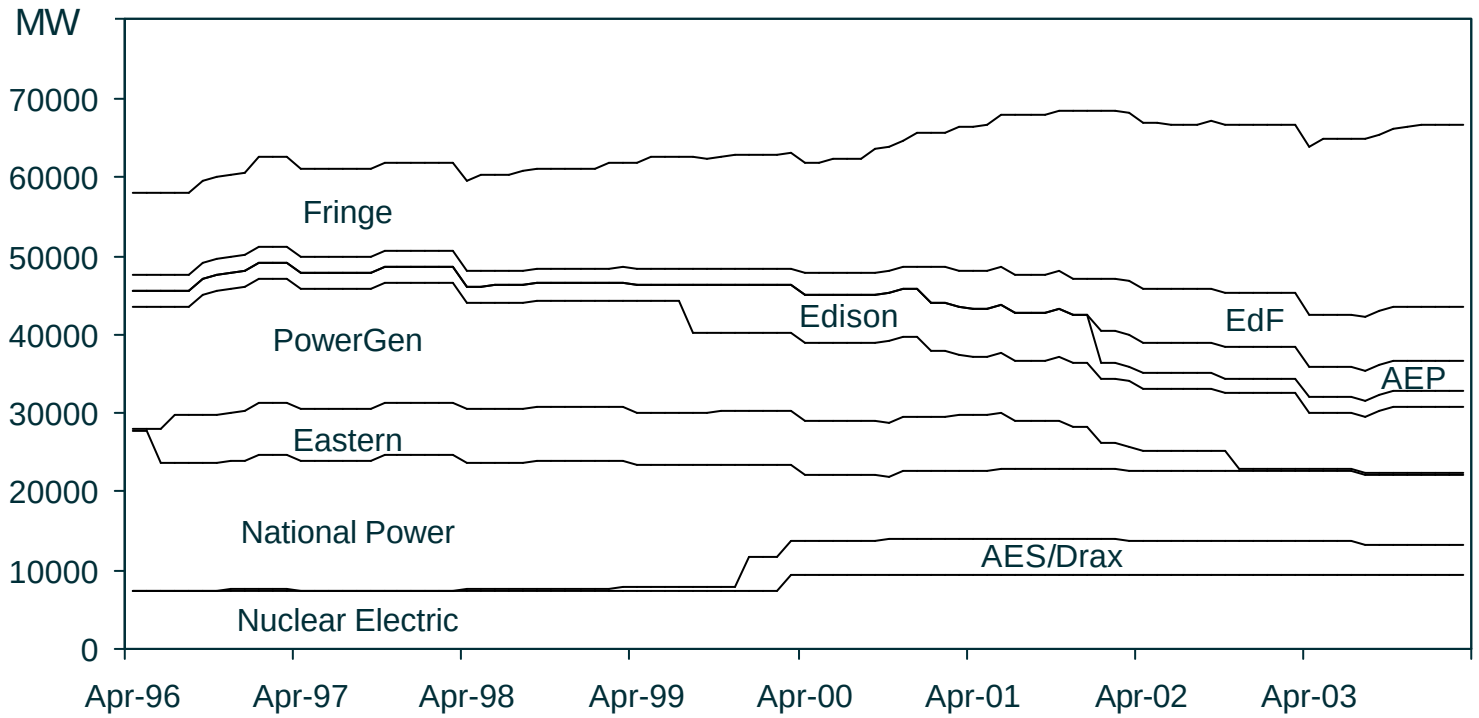
The model

- Cournot competition
  - > Generally understood, unique predictions
- Linear demand curves (21 per month)
  - > Quantities are 0^{th}, 5^{th},10^{th} … percentile of month's demand
  - > Prices are 2.5^{th}, 5^{th}, 10^{th} … percentile of actual prices averaged across all months
  - > Equal slopes give average elasticity of around -0.2
- Marginal costs: fuel and variable O&M
  - > S/M/L coal, early/mid/late CCGT, Oil, OCGT, PS Hydro

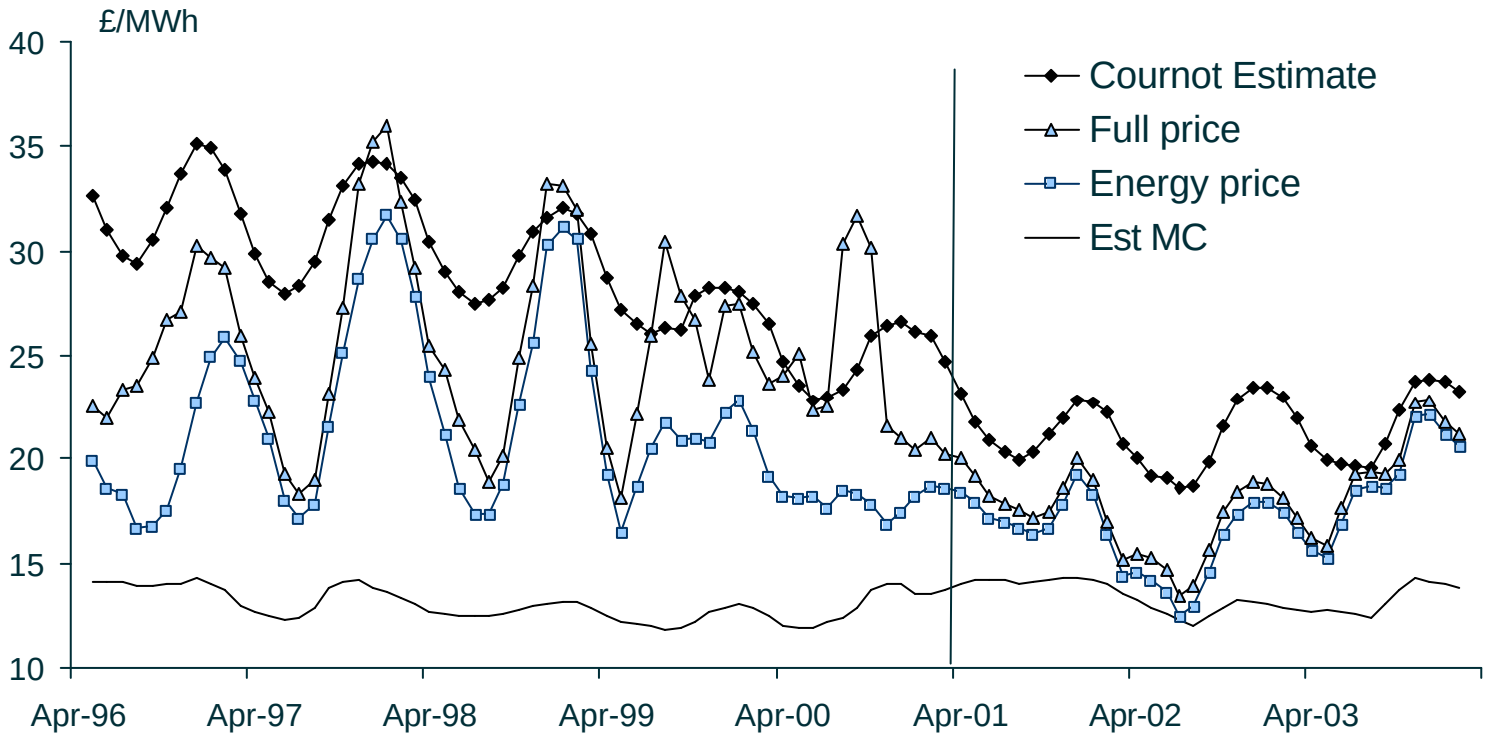
The firms

- Seven strategic firms:
  - > National Power, PowerGen, Eastern, Edison, EdF, AES, AEP
- One semi-strategic:
  - > British Energy runs all its available nuclear plant, but follows Cournot strategy for Eggborough (coal)
- Competitive fringe:
  - > Magnox stations, independent CCGTs & a couple of coal

Capacity by firm



Prices and costs
(3-month moving averages)



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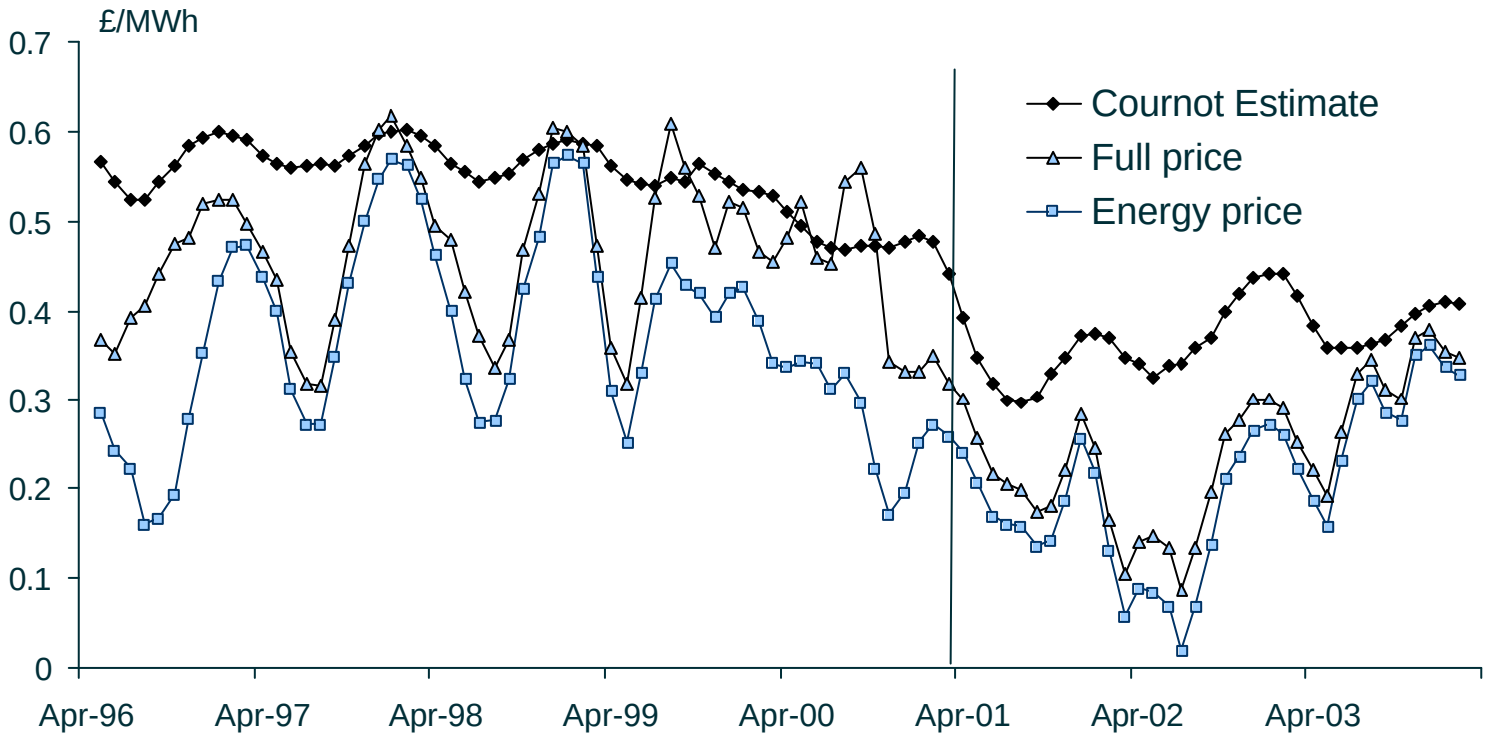
Lerner indices: (P-C)/P
(3-month moving averages)



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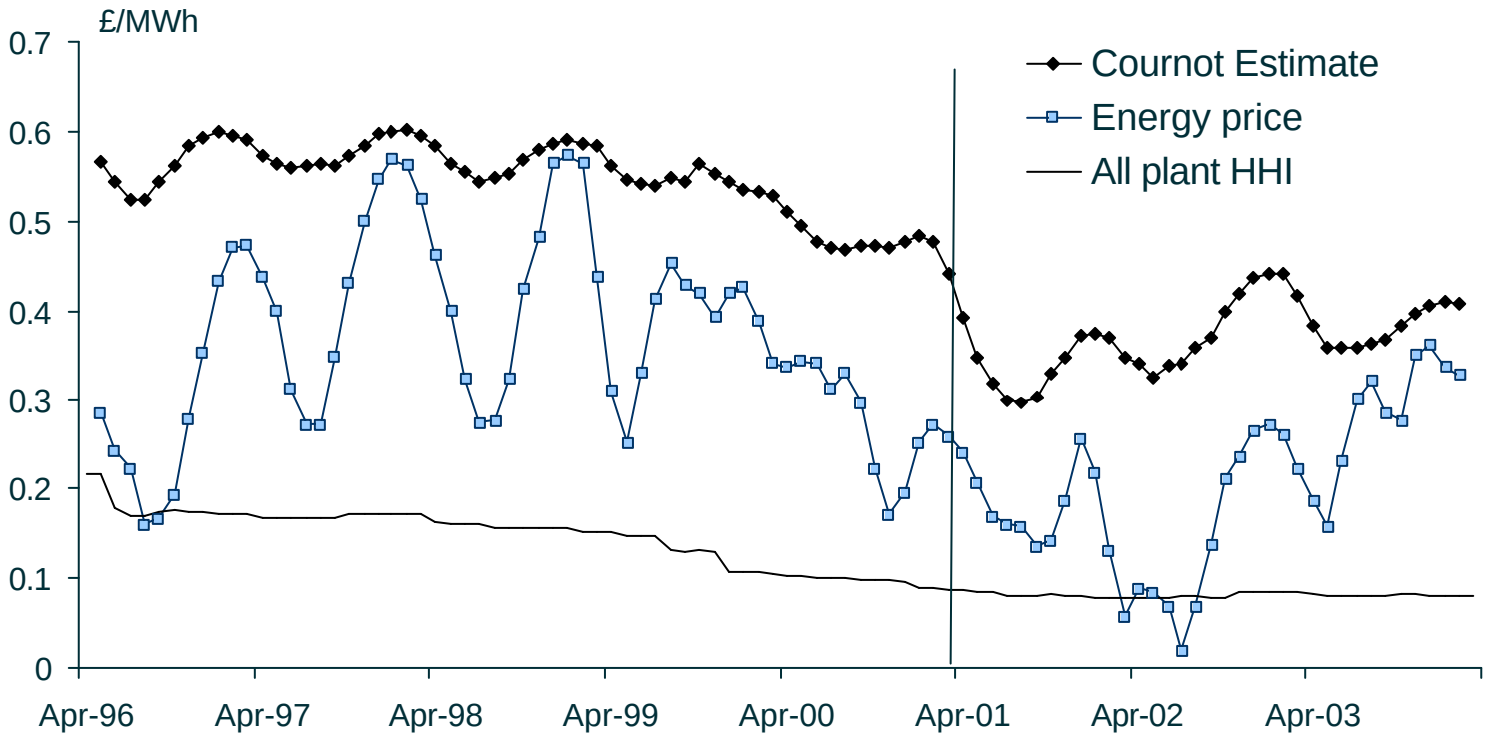

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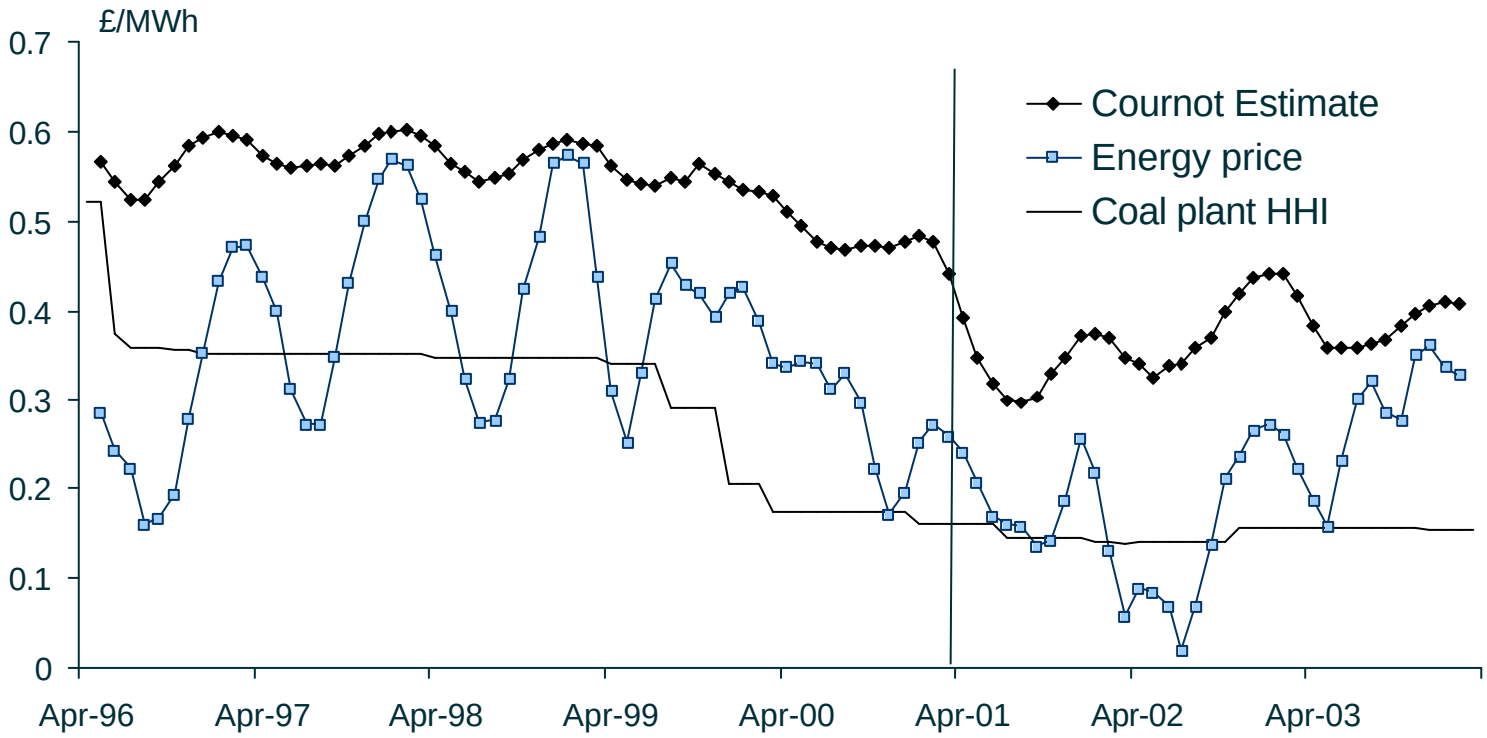

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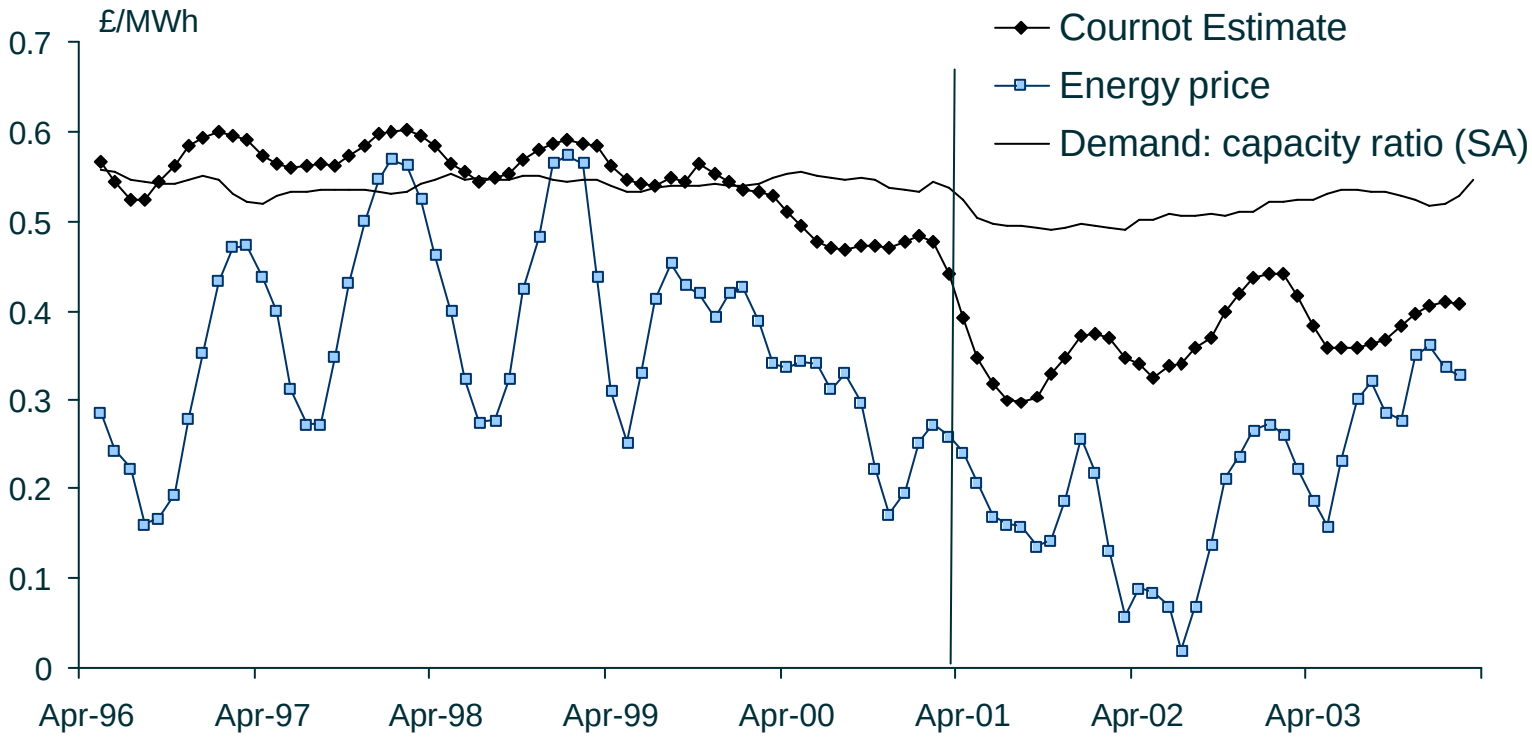

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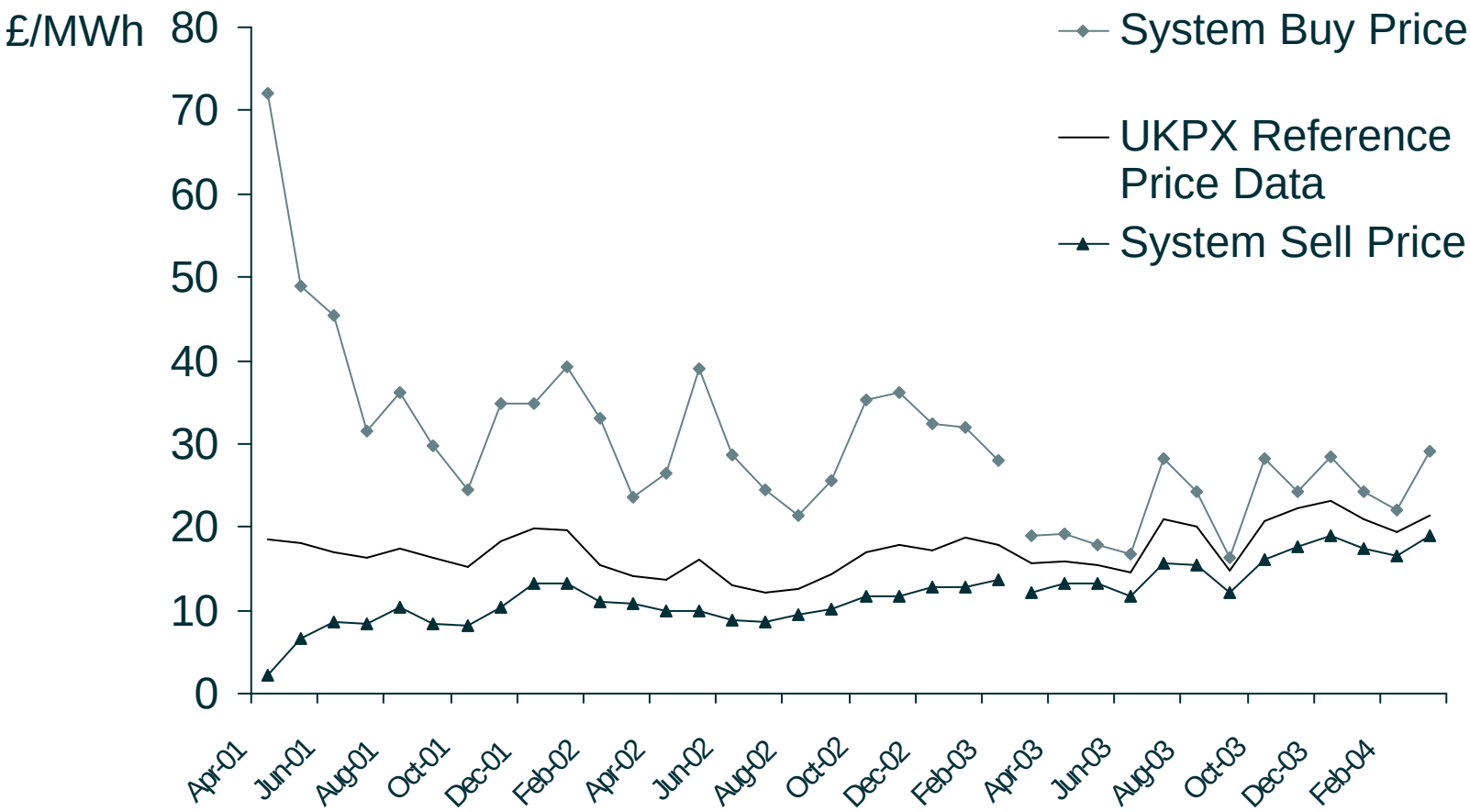
Mean Electricity Prices



Conclusions

- Many things changed at the time NETA was introduced
- Prices would have fallen under “constant market rules”
- Prices may have fallen further than this in 2002
- Prices seem to have recovered recently!