

NETA and Electricity Prices

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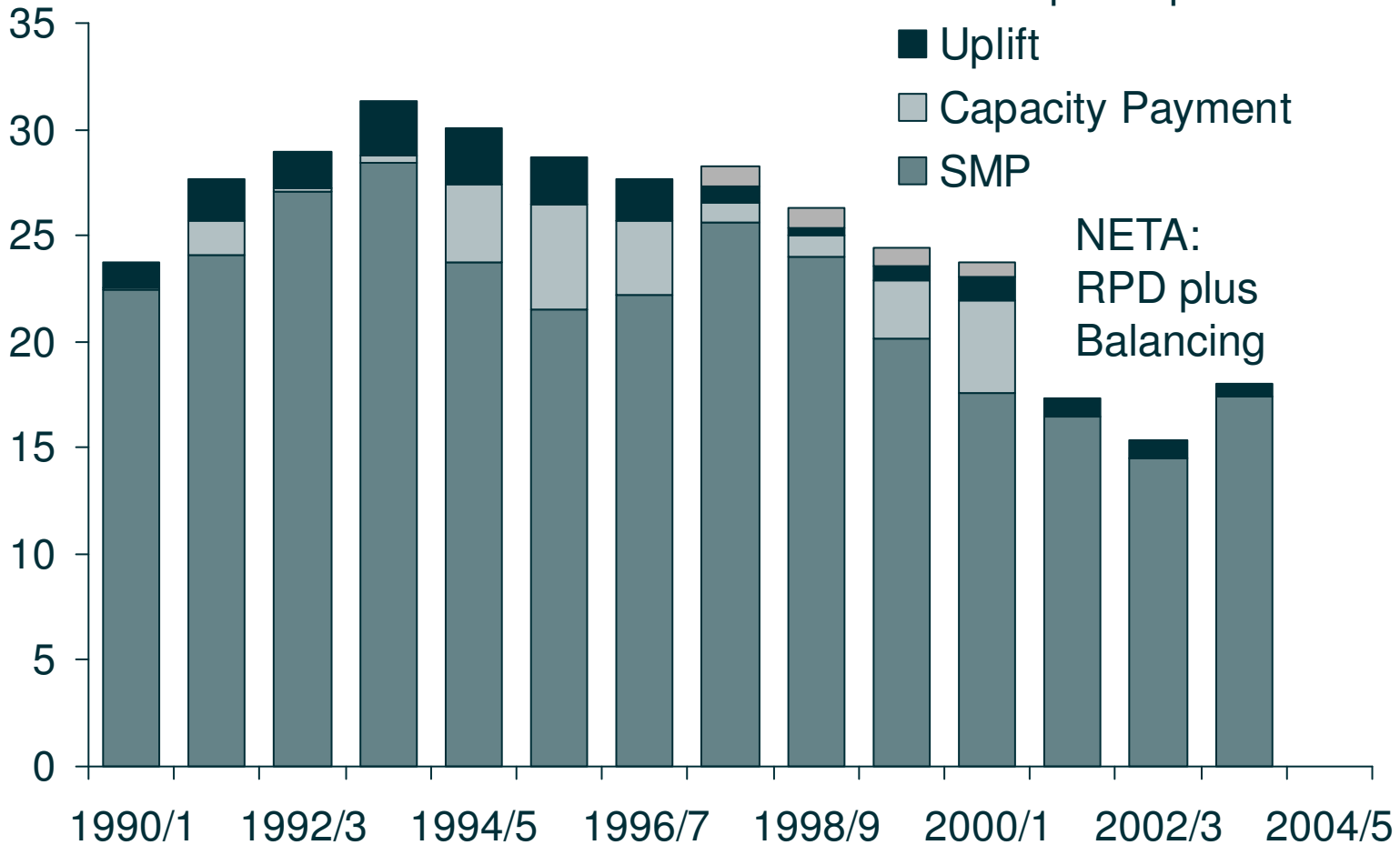
Outline

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



E&W Electricity Prices

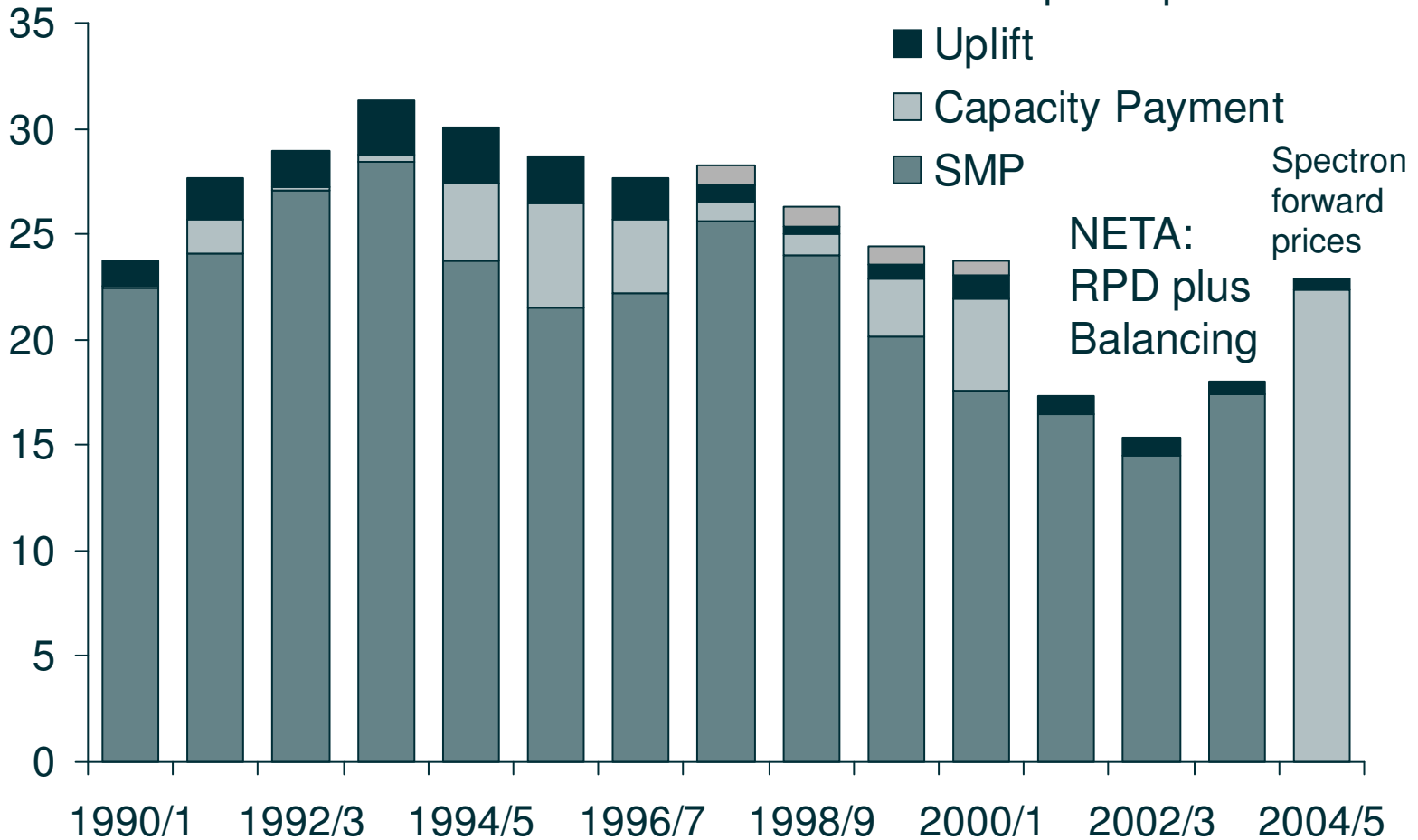
£/MWh
(99/00)



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E&W Electricity Prices

£/MWh
(99/00)



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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)

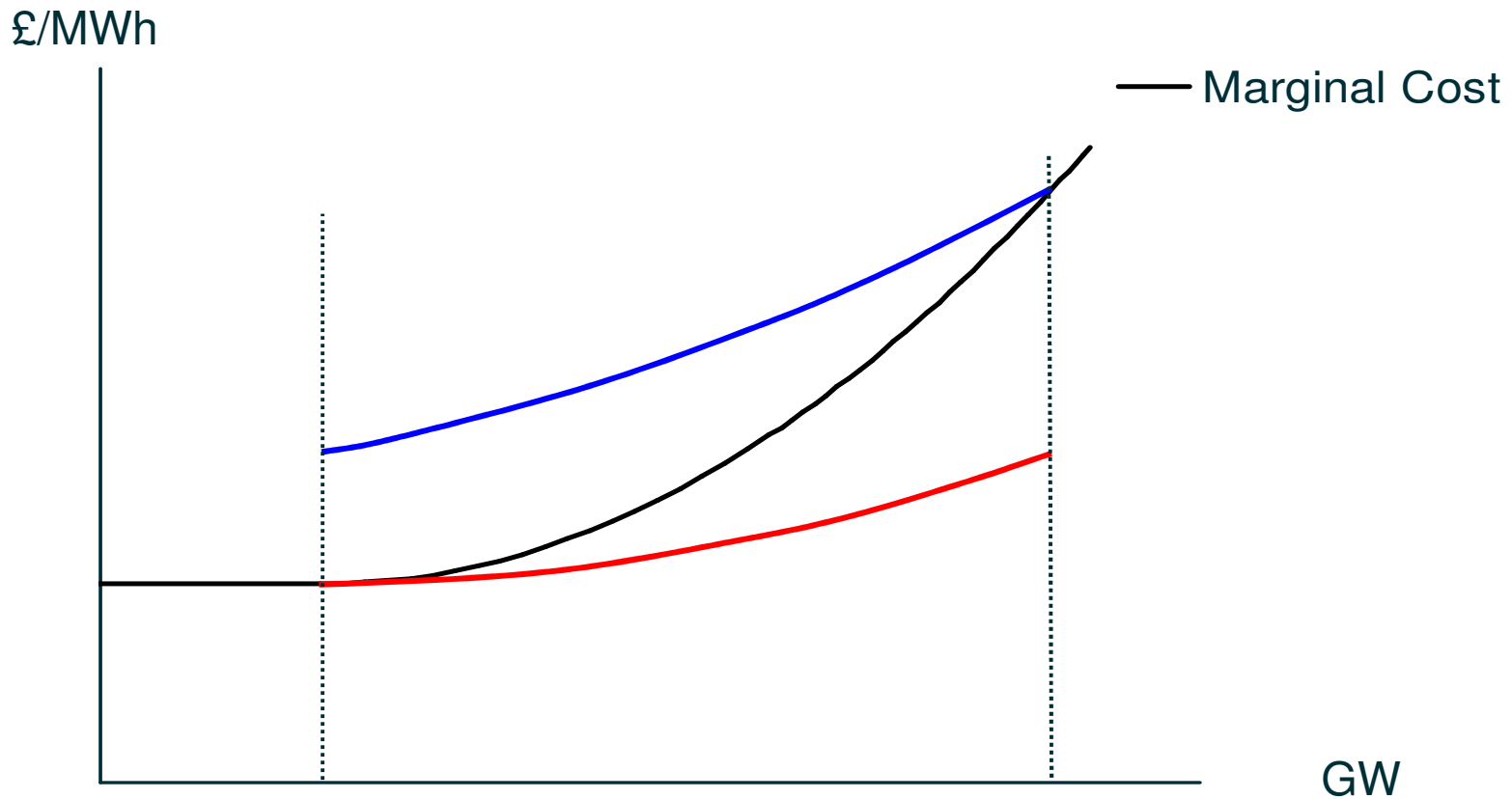


Bids in the Balancing Mechanism

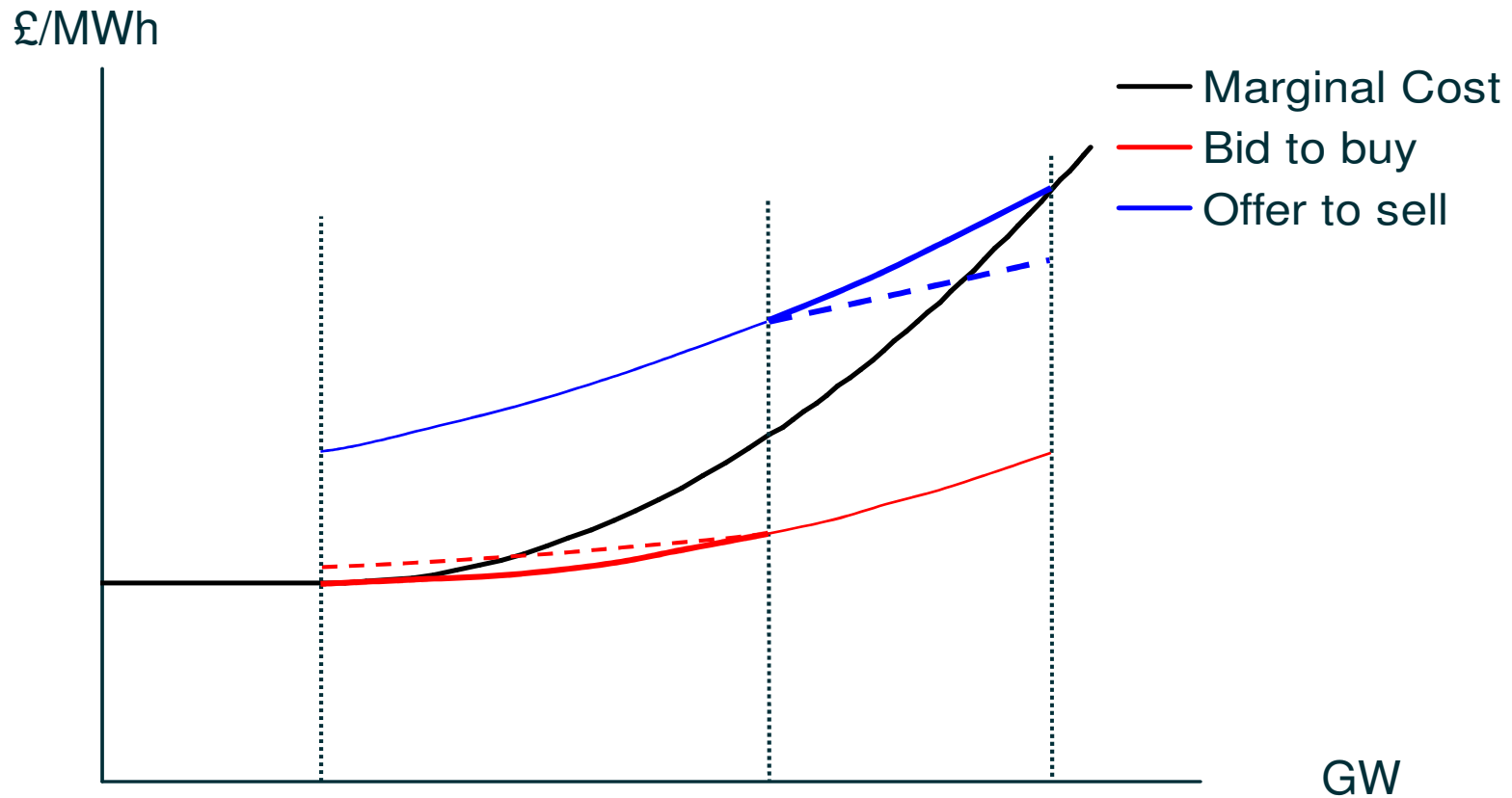
- The highest-cost seller with a chance of being needed bids at marginal cost
 - > Assuming there are others with still higher costs
- Other sellers bid above marginal cost
- The lowest-cost buyer with a chance of being needed bids at marginal cost
 - > Assuming there are others with still lower costs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



The Balancing Mechanism



The Balancing Mechanism

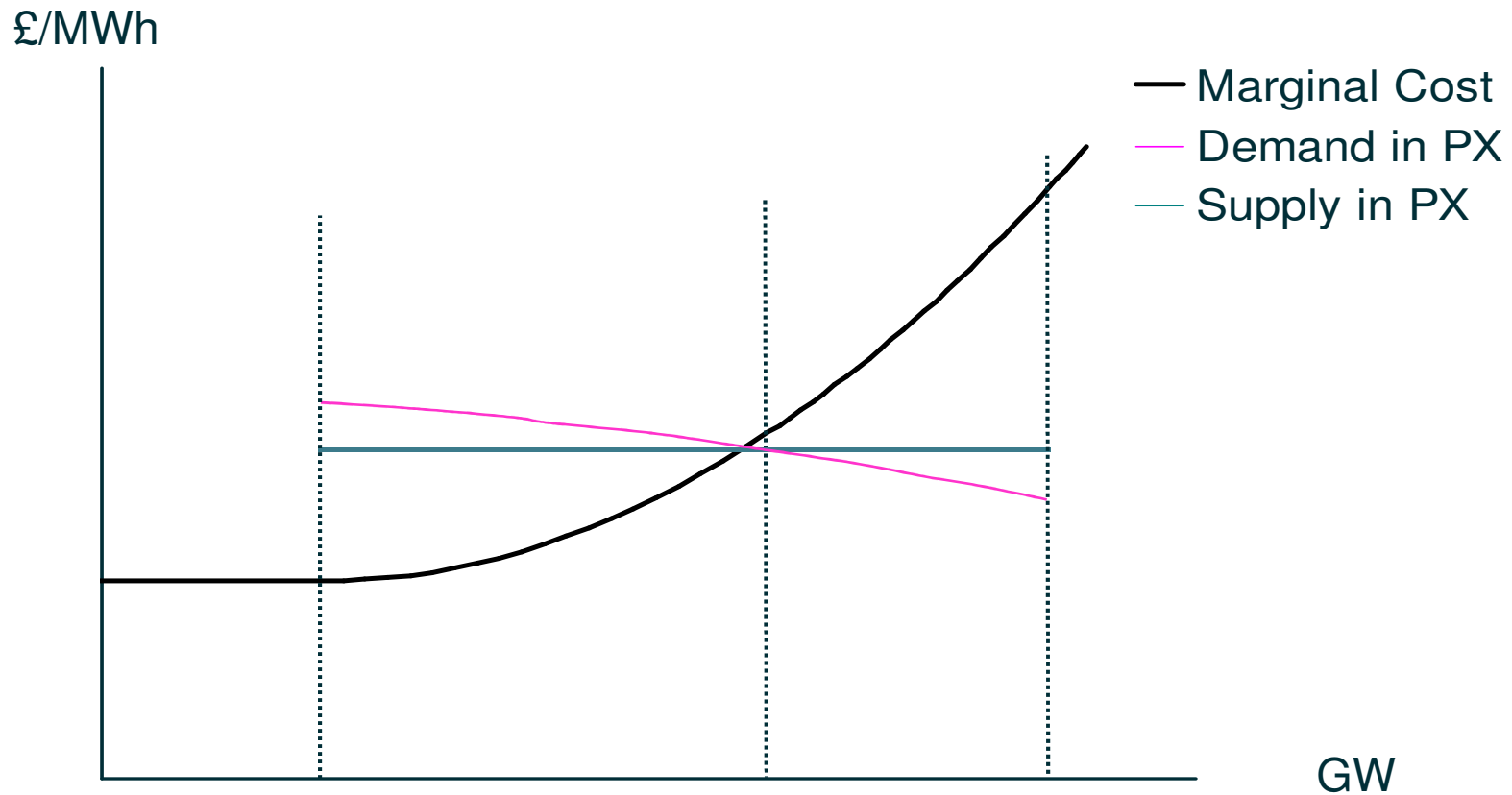


Where should they trade?

- 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

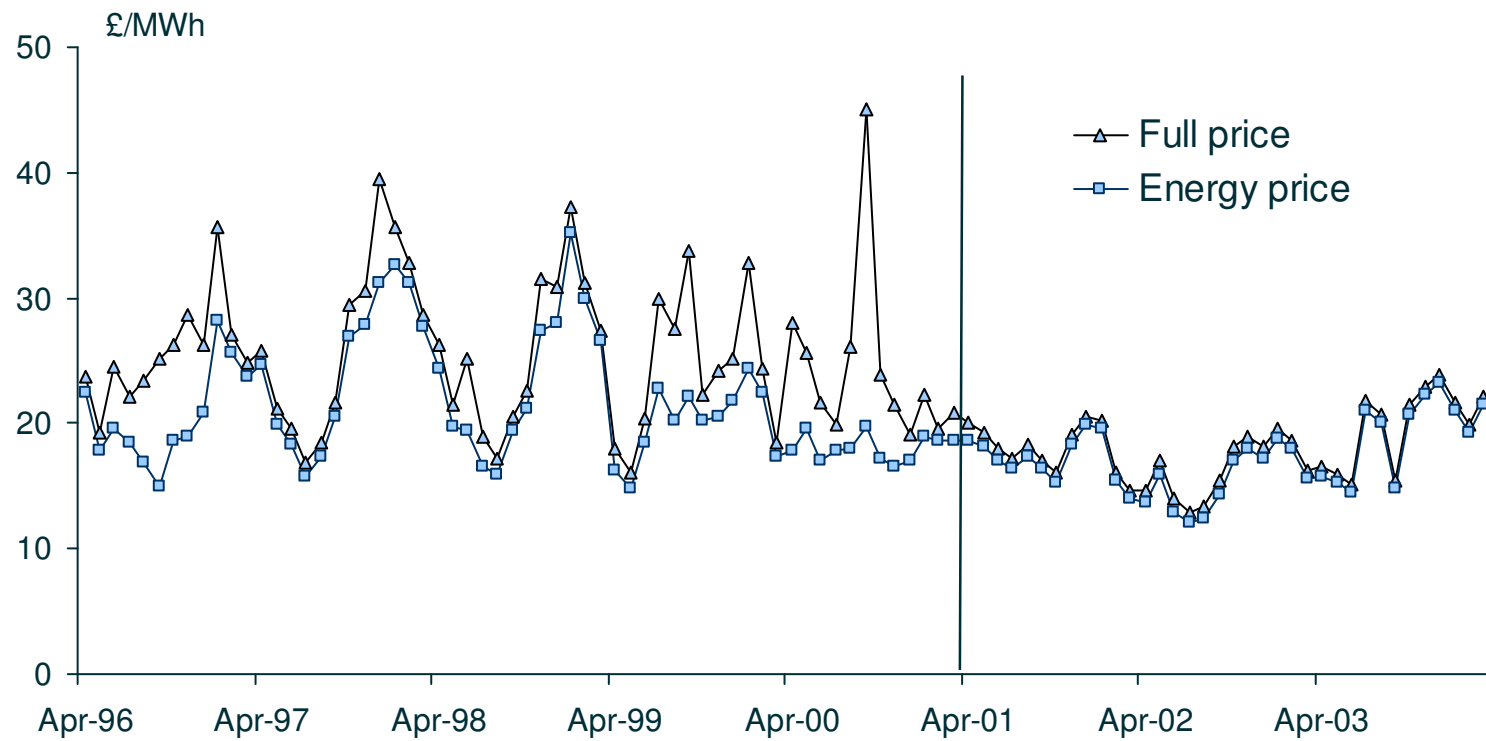


Implications

- 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



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Why did British Electricity Prices Fall After 1998? (mk II)

Joanne Evans and Richard Green



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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 0th, 5th, 10th ... percentile of month's demand
 - > Prices are 2.5th, 5th, 10th ... percentile of actual prices
 - > 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

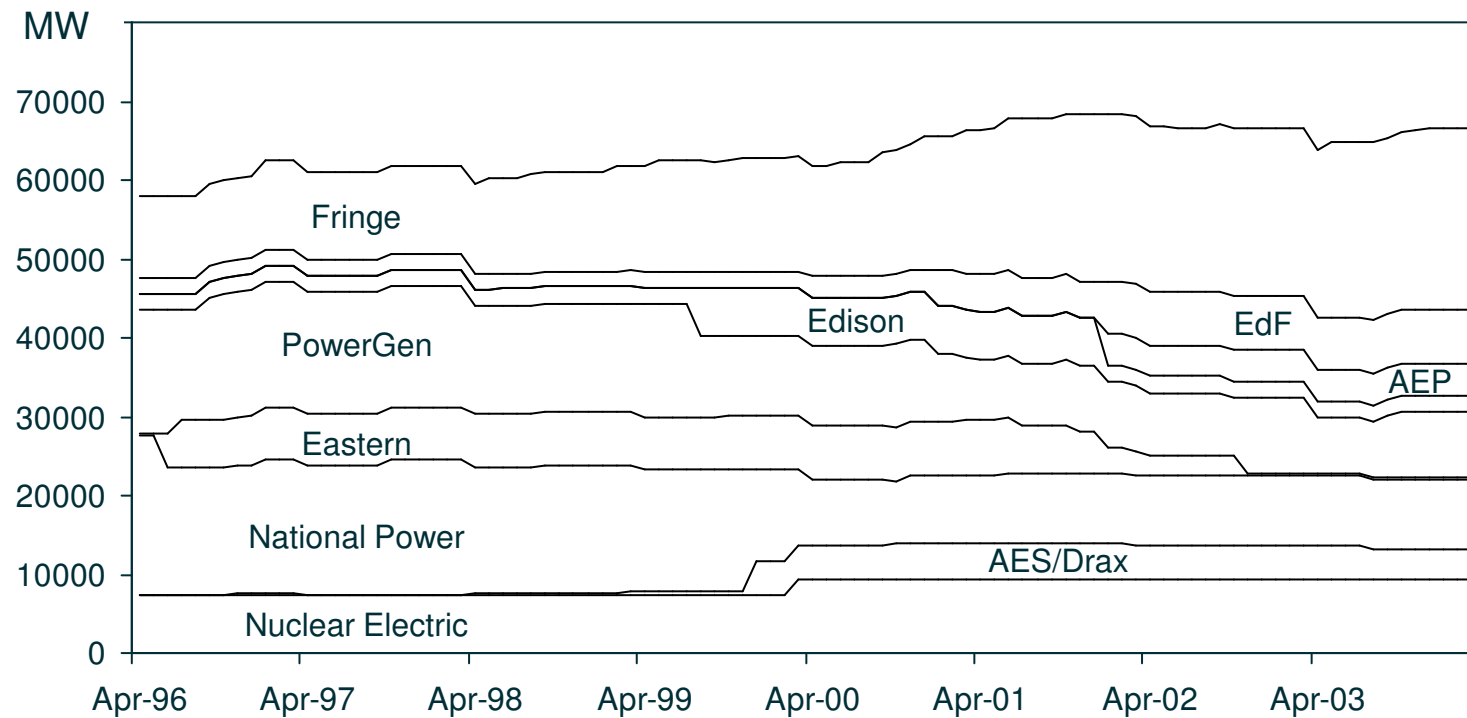


The firms

- 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

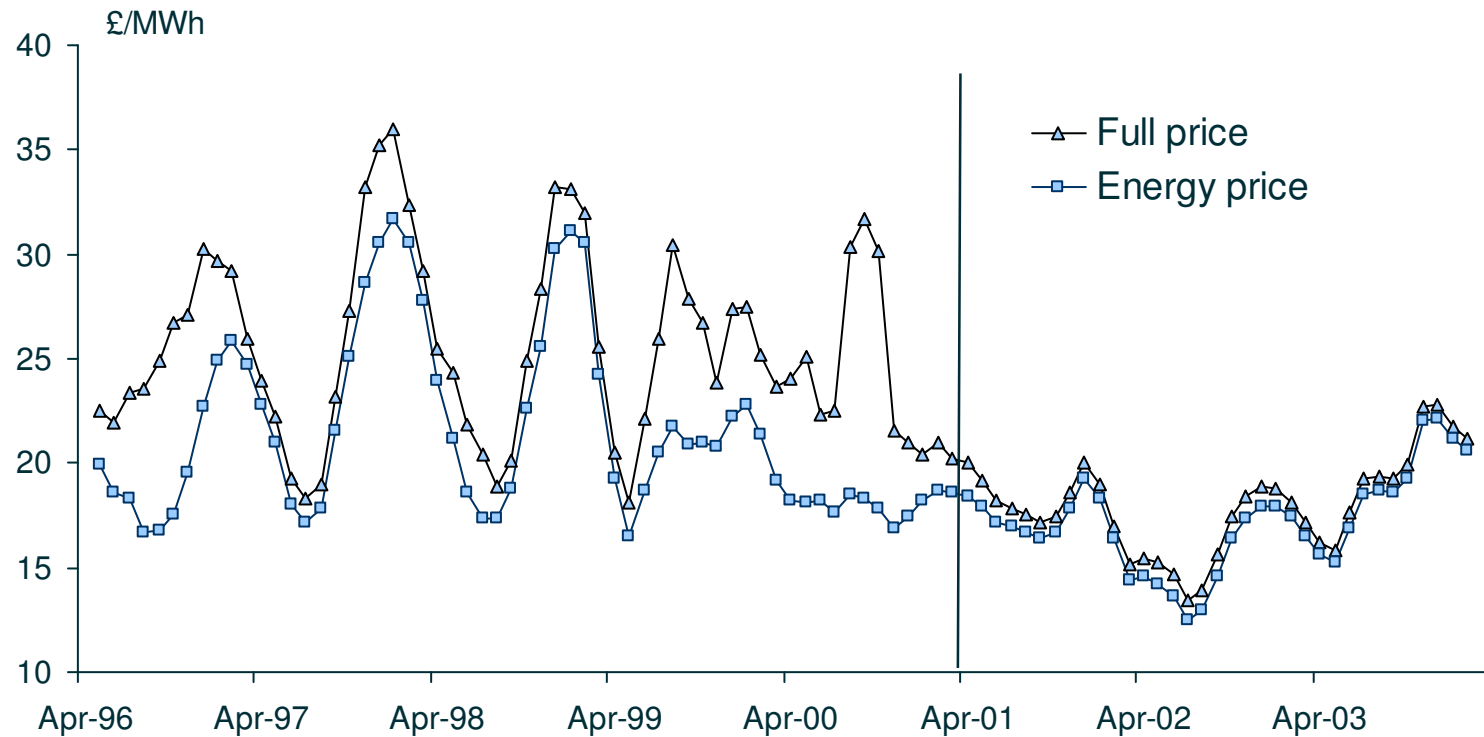


Capacity by firm

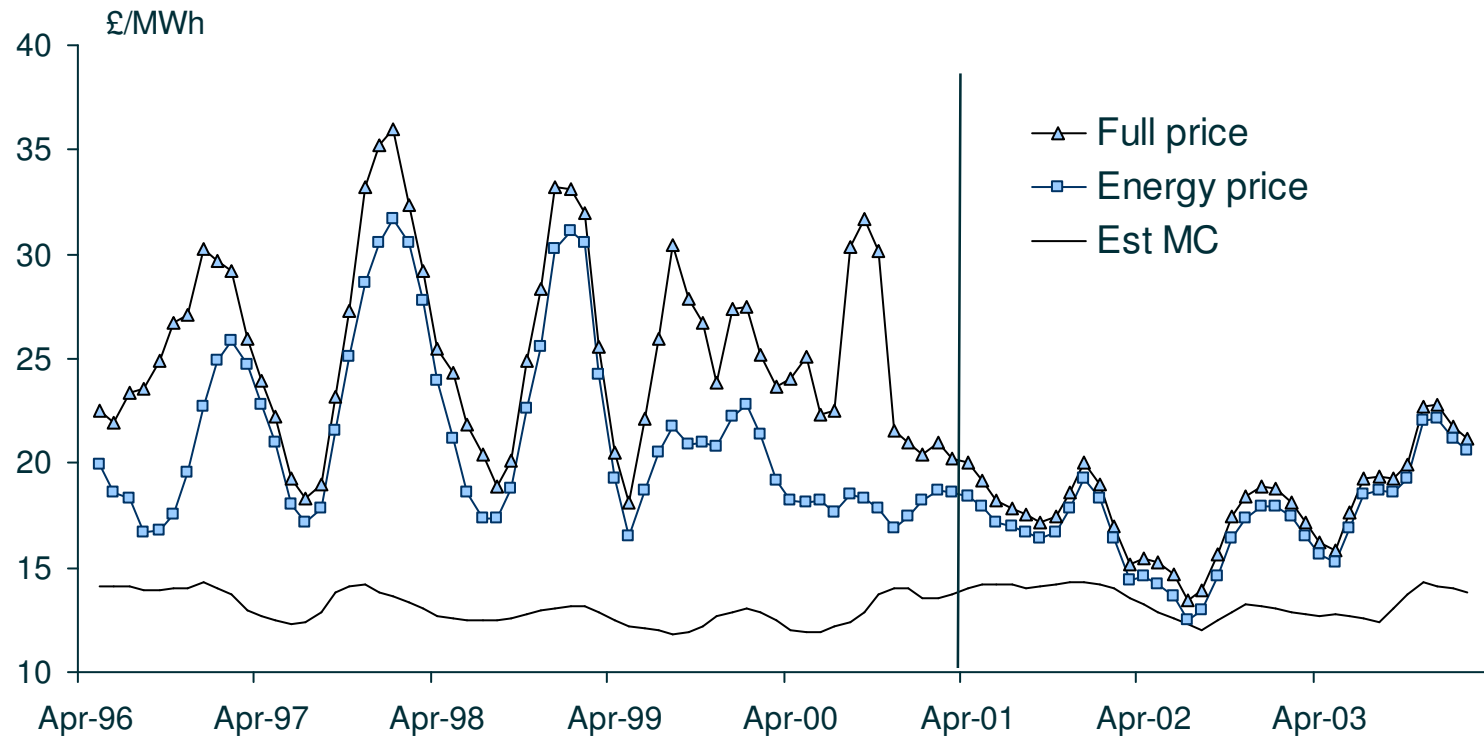


Prices

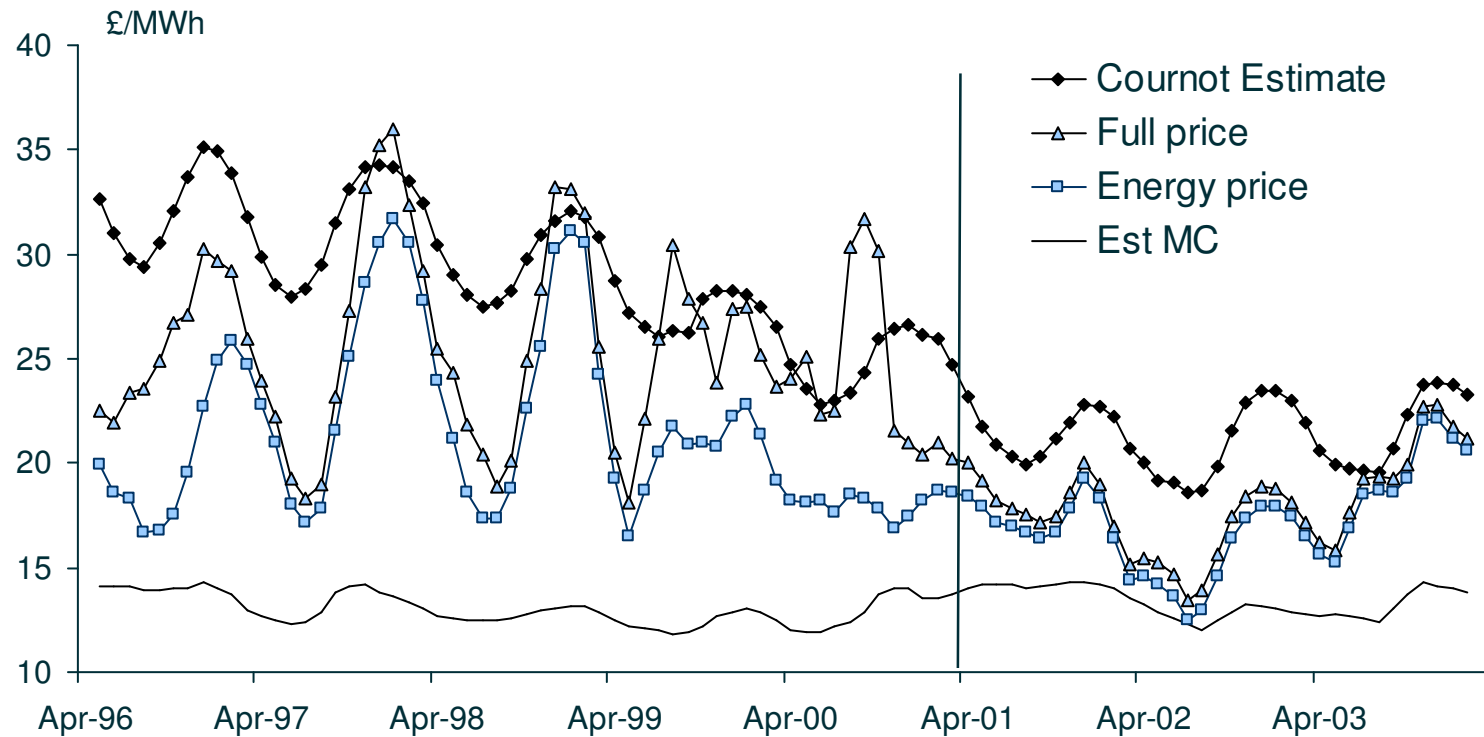
(3-month moving averages)



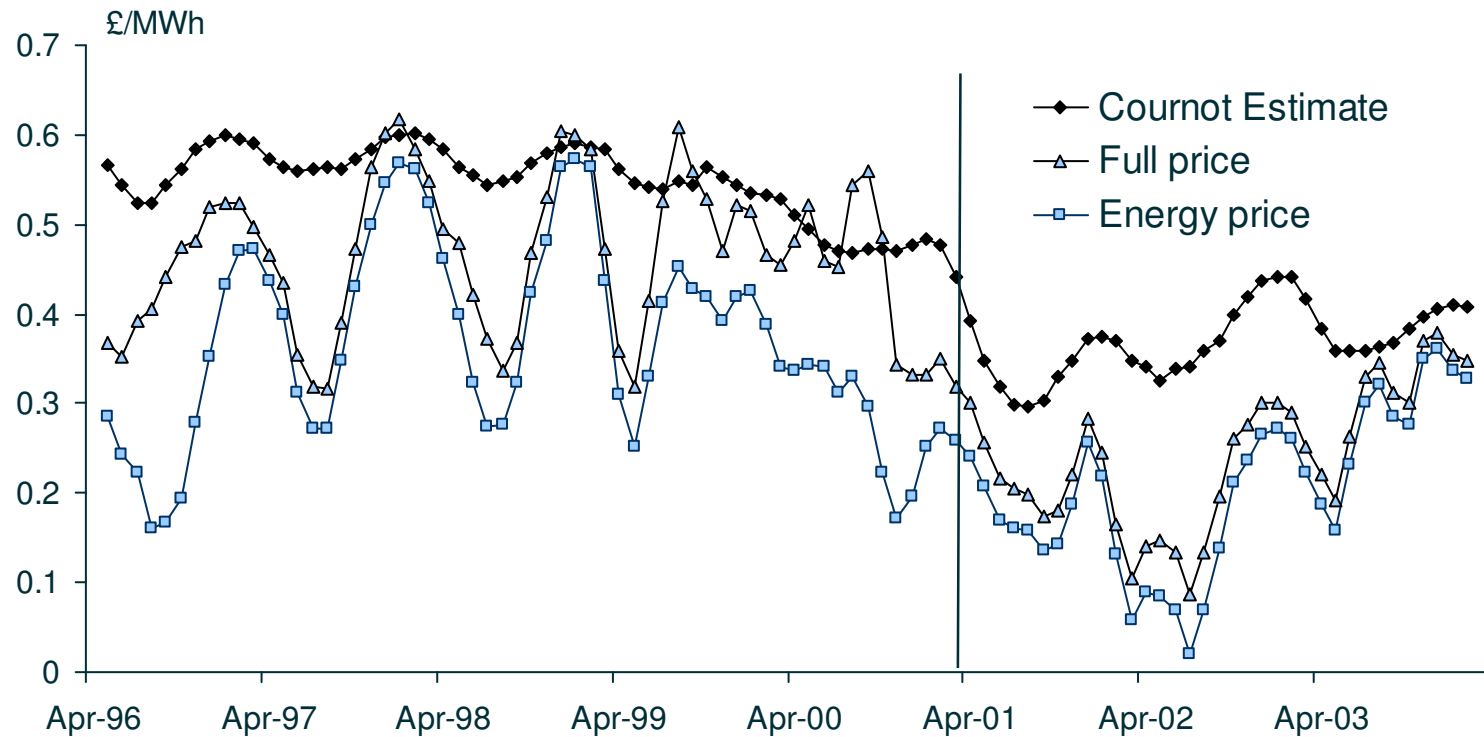
Prices and costs (3-month moving averages)



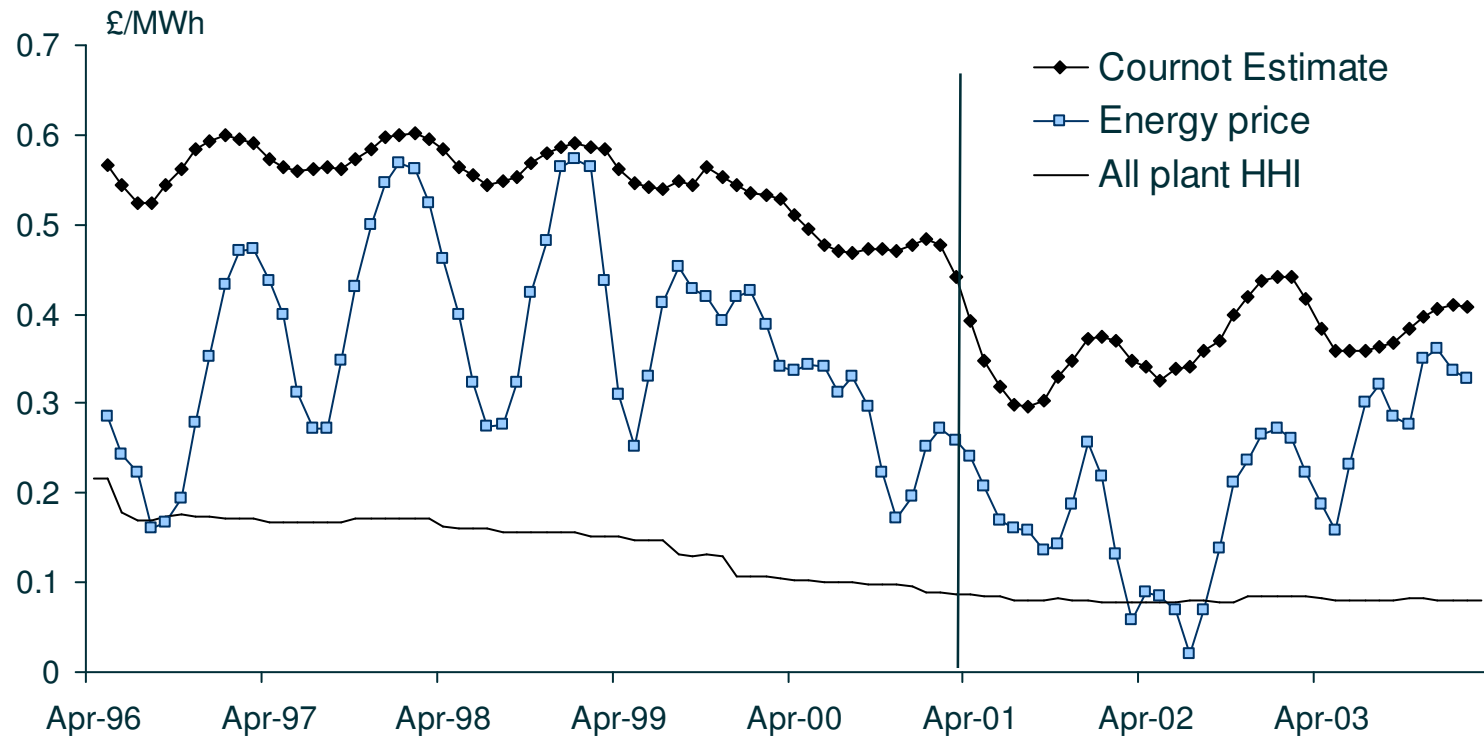
Prices and costs (3-month moving averages)



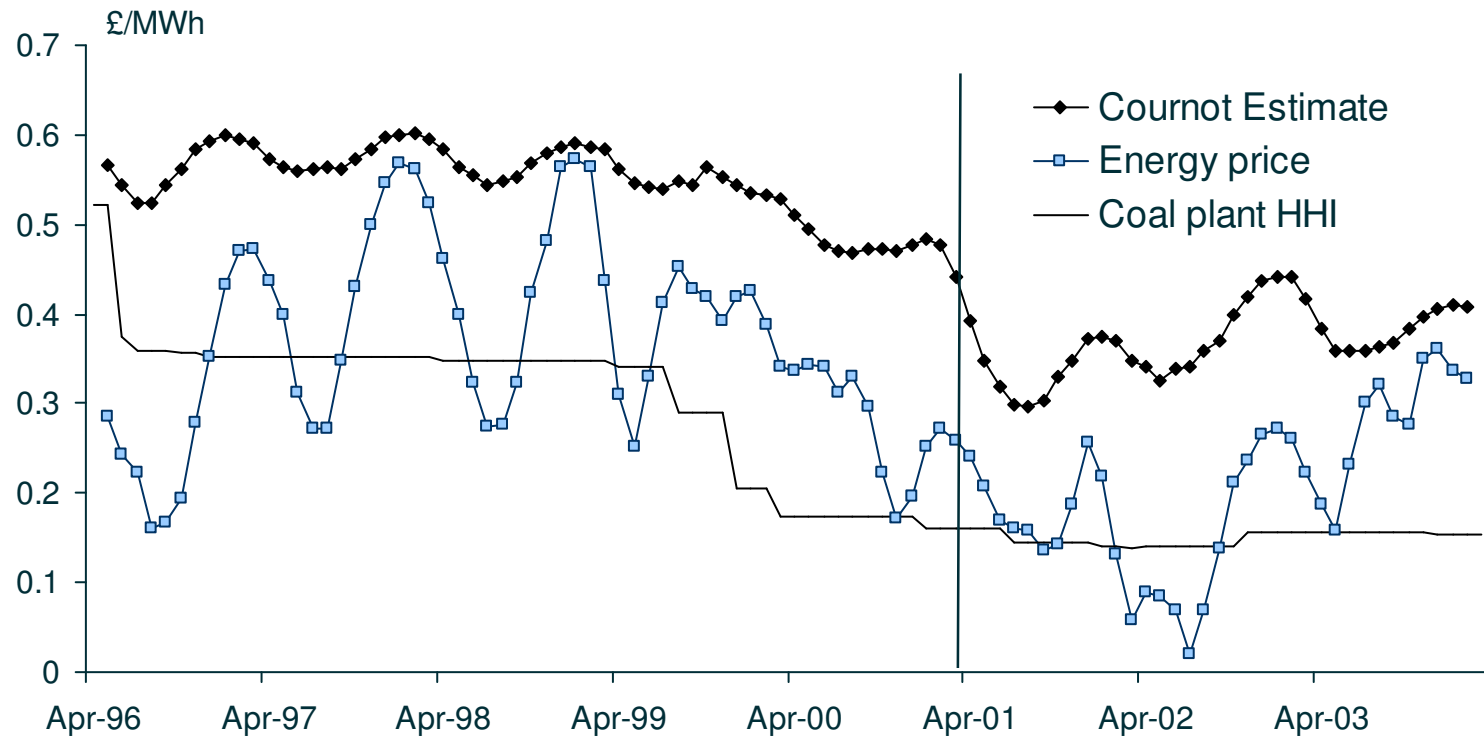
Lerner indices (3-month moving averages)



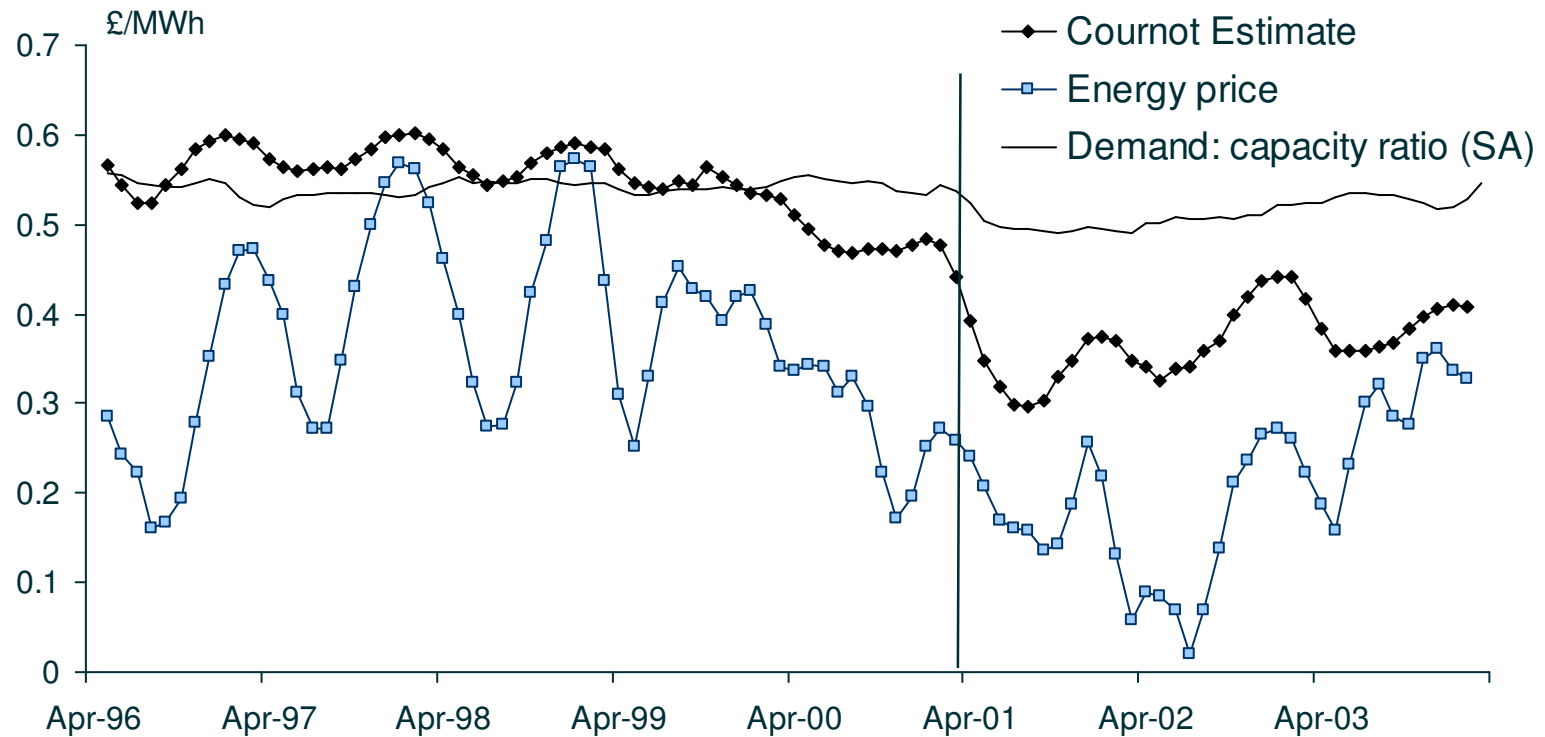
Lerner indices (3-month moving averages)



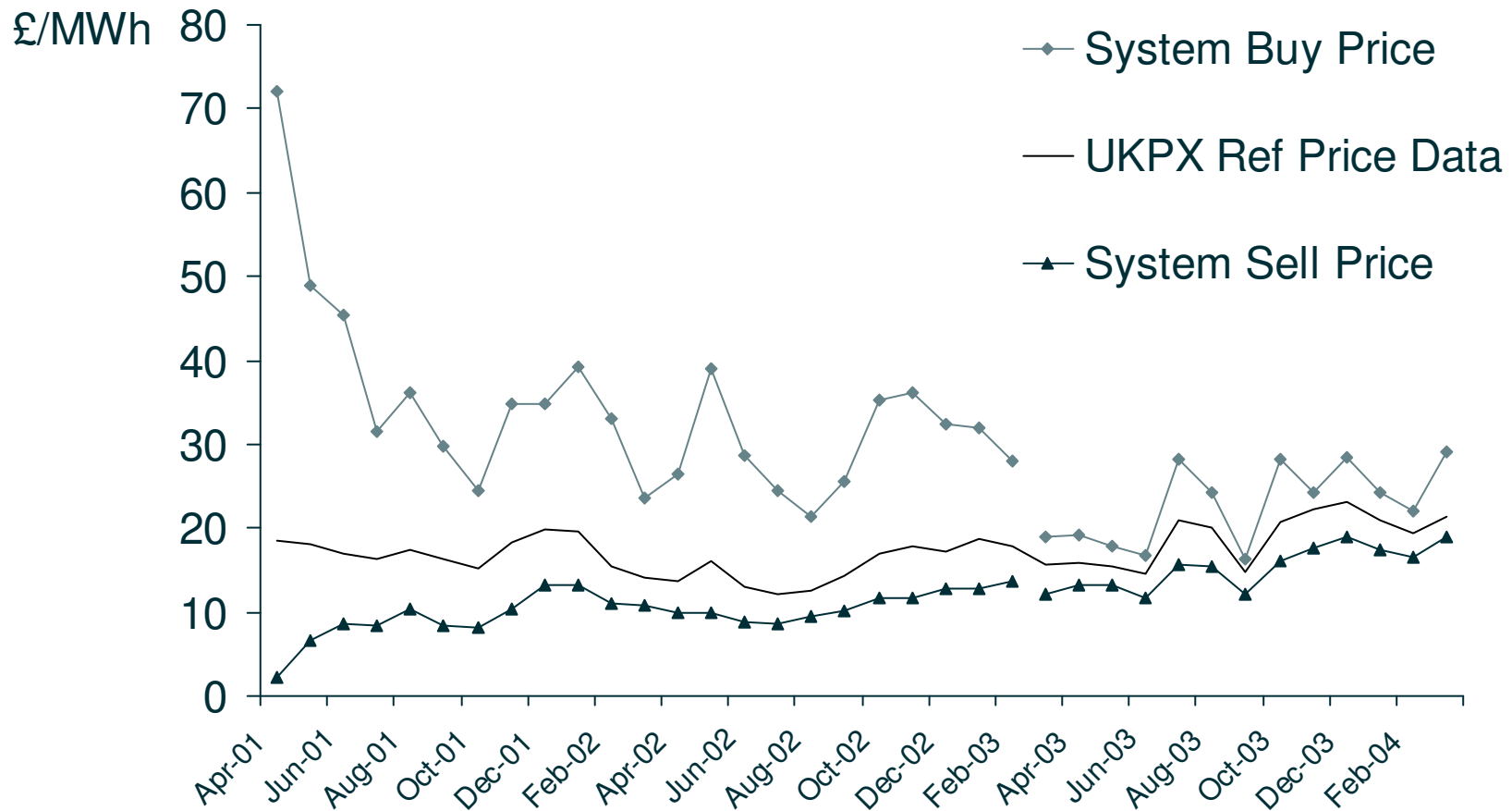
Lerner indices (3-month moving averages)



Lerner indices (3-month moving averages)



Mean Electricity Prices



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Regression of Energy Price

	coefficient	t-statistic
Constant	- 7.497	2.08
Cournot price	0.712	7.84
NETA	2.558	2.49
Demand : Capacity	14.931	1.98
AR(1) term	0.486	4.66
R^2 0.840	R-bar ² 0.832	DW 1.921



Regression of Full Price

	coefficient	t-statistic
Constant	- 8.584	2.75
Cournot price	1.152	10.98
NETA	3.025	2.18
Sept 2000 dummy	9.071	3.79
AR(1) term	0.556	5.80
R^2 0.860	$R\text{-bar}^2$ 0.853	DW 1.898



Regression of Energy Price

	coefficient		t-statistic		
Constant		- 0.537		0.21	
Cournot price		0.750		9.12	
Para-NETA		2.221		1.80	
AR(1) term		0.593		6.24	
R^2	0.829	$R\text{-bar}^2$	0.822	DW	1.877



Regression of Full Price

	coefficient	t-statistic
Constant	- 7.022	2.21
Cournot price	1.102	10.56
NETA	2.020	1.41
Sept 2000 dummy	10.390	4.36
AR(1) term	0.556	5.73
R ² 0.855	R-bar ² 0.848	DW 1.851



Conclusions

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





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