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Elecxit: The Impact of Barriers to Electricity Trade after Brexit

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Introduction

- The United Kingdom is in the process of leaving the EU.
- The UK government has given itself a red line of not coming under the jurisdiction of the European Court of Justice, which has oversight of the Single Electricity Market.
- It is conceivable that the United Kingdom will leave the Single Electricity Market.
- We ask two questions:
    1. **What does leaving the Single Electricity Market mean and imply for the electricity system (Elecxit)?**
    2. **What are the midterm (2030) costs of this Elecxit?**
- Answers: Elecxit scenario, model framework and simulation

Elecxit scenario: Brexit Impact channels

- Tariffs on
  - electricity exchange
  - (oil and) gas (55% non UK)
- **Infrastructure development - Interconnection**
  - electricity 4GW → 12GW 2020
    financing, at risk?
- European institutions
  - market rules (**market coupling**; cross-border balancing; capacity market trading)
  - carbon pricing (EU-ETS)
  - renewable energy directive
  - euratom
- Nuclear research (incl. fusion)

→ **Elecxit scenario:** 1. limited interconnector capacity expansion

2. market uncoupling

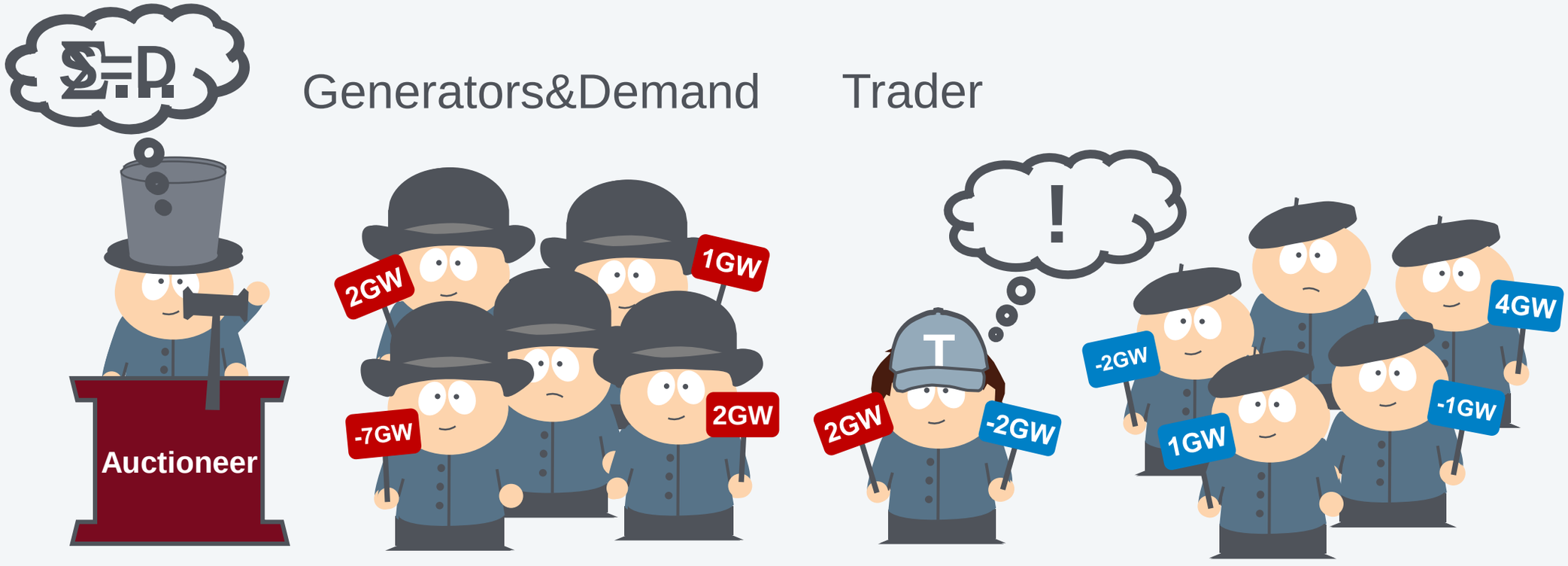
Simplified model of electricity trading in coupled markets…

Day ahead UK&F auction
Round **1** price proposal:

60 €/MWh

80 €/MWh

Market closure



…. And in uncoupled markets

Day ahead auction UK
Round **1** price proposal:

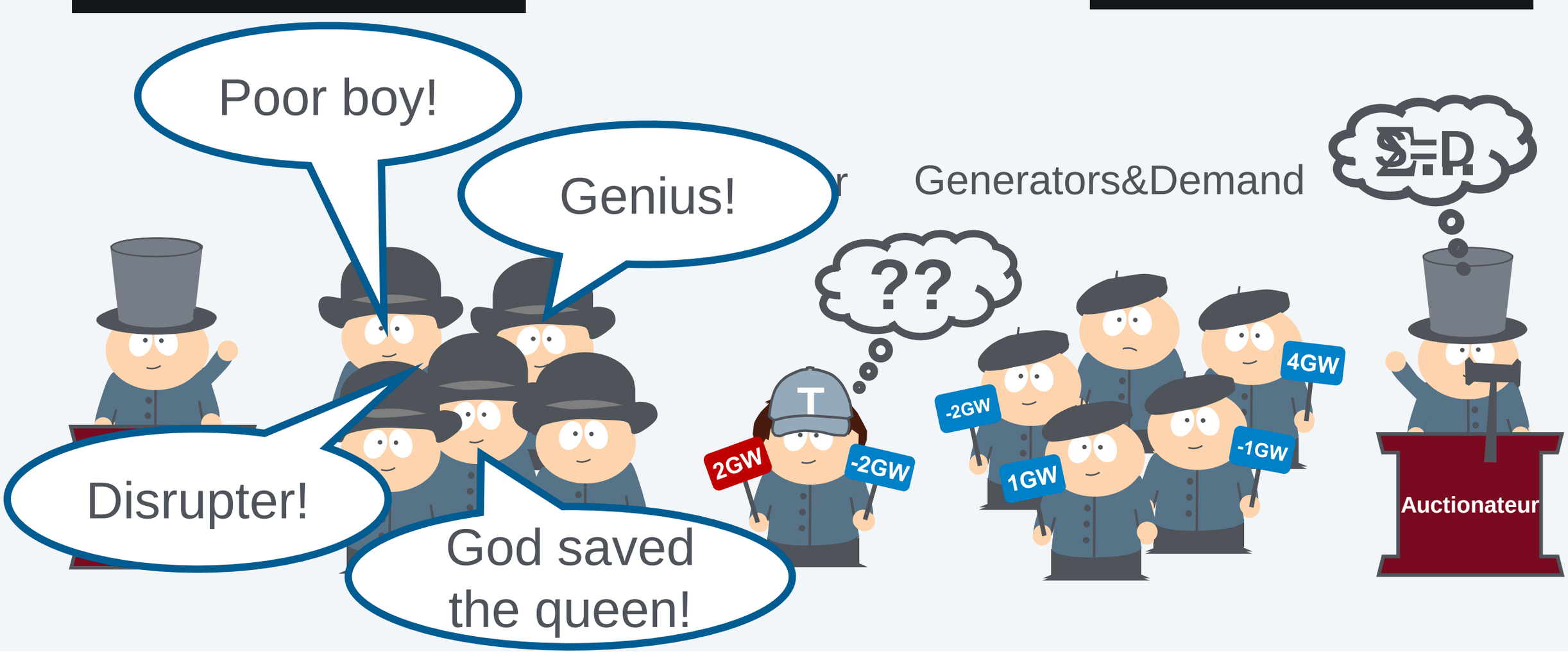
60 €/MWh

Market closure F

Market closure UK

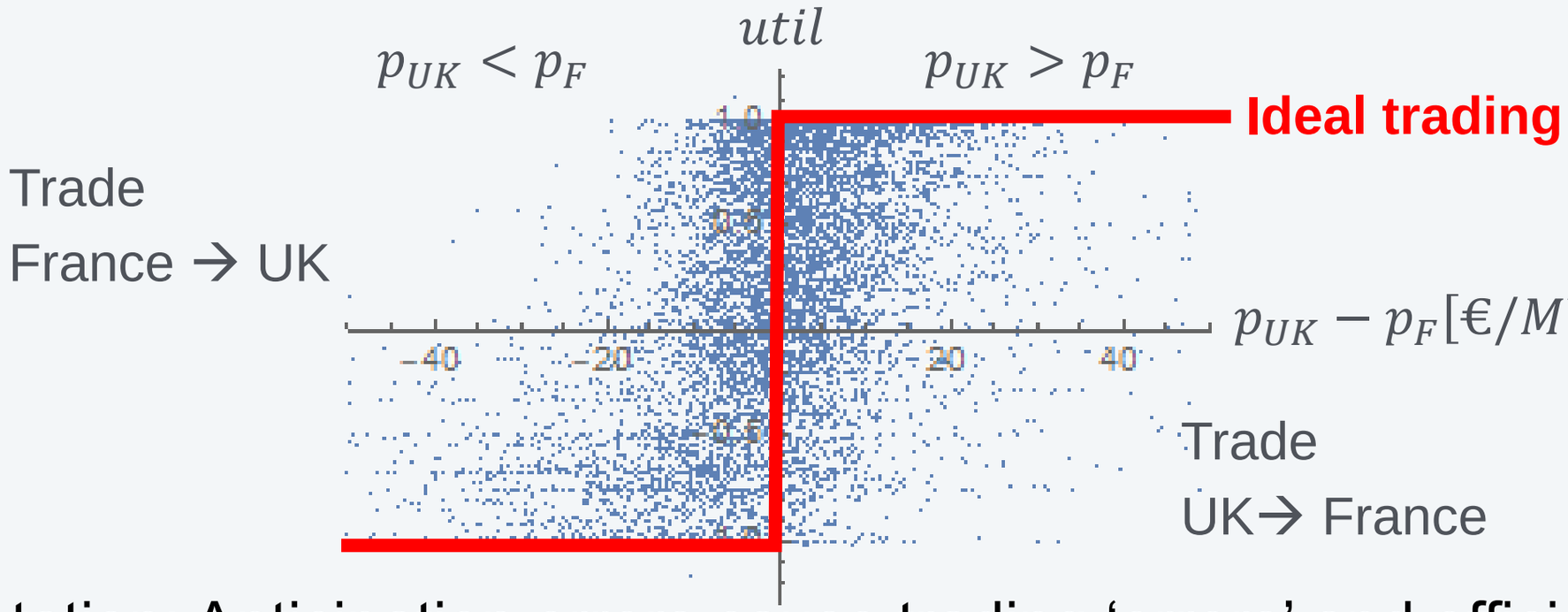
Day ahead auction F
Round **1** price proposal:

80 €/MWh



Uncoupled Markets

- European electricity markets uncoupled until 2014.
- Traders complained about the necessity to anticipate UK prices.
- Impact: trading vs. price difference:



- Interpretation: Anticipation errors cause trading ‘errors’ and efficiency losses (in a world of increasing marginal cost).
- Since 2014 markets are coupled via ‘Euphemia’.

Elecxit costs

- **Brexit scenario:** market uncoupling = - market coupling; with Elecxit the same conditions of uncoupled markets (before 2014) apply
- **Model:** bilateral equilibrium of distorted trade under capacity constraints → distortion depends on 1. supply curvature, 2. variance of the anticipation error (coupling = 0!) and transmission capacity.
- **Calibration** of variance by welfare gains of market coupling (0.5% of market value).
- **Simulation Elecxit 2030:** ENTSOE Vision 3, generation structure, load profiles generated with DESSTINEE (Green&Staffell, open source), variance extrapolated from 2010, x2

Results / Conclusion

Index of costs		**Interconnector Capacity Scenarios**	
		5 GW	10 GW
Market Design Scenario	Uncoupled ($\sigma > 0$)	Hard Elecxit 1.026	1.009
	Integrated ($\sigma = 0$)	1.021	1.000 Soft Elecxit

- **Elecxit** in the dynamic future of electricity markets can be expected to be **5 times as costly as market coupling** reduced generation costs in the past.
- The **‚loss' of trading infrastructure** could be **twice as expensive as market uncoupling**.
- Perspective: Switch to **trade data** and estimate the (censored) distorted trade model directly → contribution to the literature of benefits from market coupling (avoid calibration step)