Dynamic pricing of electricity: money on the table?

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18 June 2019

The paper in the legislative context

"Why have the adoption of new technologies and the aggregate-level change in price responsiveness been so slow?"

- Assessing the impact of dynamic pricing of electricity = a key issue regarding the recent adoption of the "Clean Energy Package"
- Article 11 of Directive 2019/944
  - regulatory framework shall enable suppliers to offer dynamic electricity price contracts
  - final customers who have a smart meter installed can request to conclude a dynamic electricity price contract with at least one supplier and with every supplier that has more than 200 000 final customers
  - final customers shall be fully informed by the suppliers of the opportunities, costs and risks of such dynamic electricity price contracts
- Development of new uses of electricity, e.g. electromobility, and new modes of electricity consumption, self-consumption, call for an increase flexibility of demand

Summary of the paper

- Based on 3 (similar) electricity markets (California, Nordics and Spain), quantification of the impacts of dynamic pricing (eq. increase in flexibility) on:
  - Private gains (investors side)
  - Consumer surplus
  - Welfare
- Data set: 160 million bids (pair of price and quantity) from years 2002-2018
- The authors model the daily excess demand and calculate market equilibria for various value of the capacity limit $\bar{y}$

Main results

Table 2: Changes in private gains, surpluses, and welfares by region

	California			Nordic			Spain		
year	Private gain	Consumer surplus	Welfare	Private gain	Consumer surplus	Welfare	Private gain	Consumer surplus	Welfare
2011				11	-17	5	27	106	6
2012				12	465	7	37	128	9
2013				11	176	4	43	130	9
2014				11	86	3	38	77	9
2015	11	13	2	10	147	4	33	50	9
2016	15	5	3	11	305	4	24	41	6
2017	23	-6	6	9	146	3	26	33	6
2018	25	33	6	14	260	6	25	-5	6

- Consumers in the Nordics "win" whereas the ones in California and Spain "lose" when flexibility and demand response
  - ➔convexity of the daily excess demand matters
  - ➔Impact on the average price is not clear
- Private gains and welfare are low in absolute terms (<1% market value)

Some questions/remarks on the paper

- On the assumptions used in this paper
  - The data used concern wholesale prices which are only a part of the retail price
    - the variations of retail prices are lower than the ones of wholesale prices
    - there is less hours where the arbitrage is profitable

  ➔Did you look at a difference in variation between wholesale and retail prices?

  - The share of intermittent renewable energy sources is different in the three markets. Does the intermittency have an impact on the convexity of the supply curve?
- Policy recommendations?
  - From a policy point of view, is it possible to ensure that flexibility only happens in the convex part of the supply curve ?
  - How could policy makers encourage consumers to increase their flexibility and in particular to switch demand from “high-carbon hours” to “low-carbon hours”?

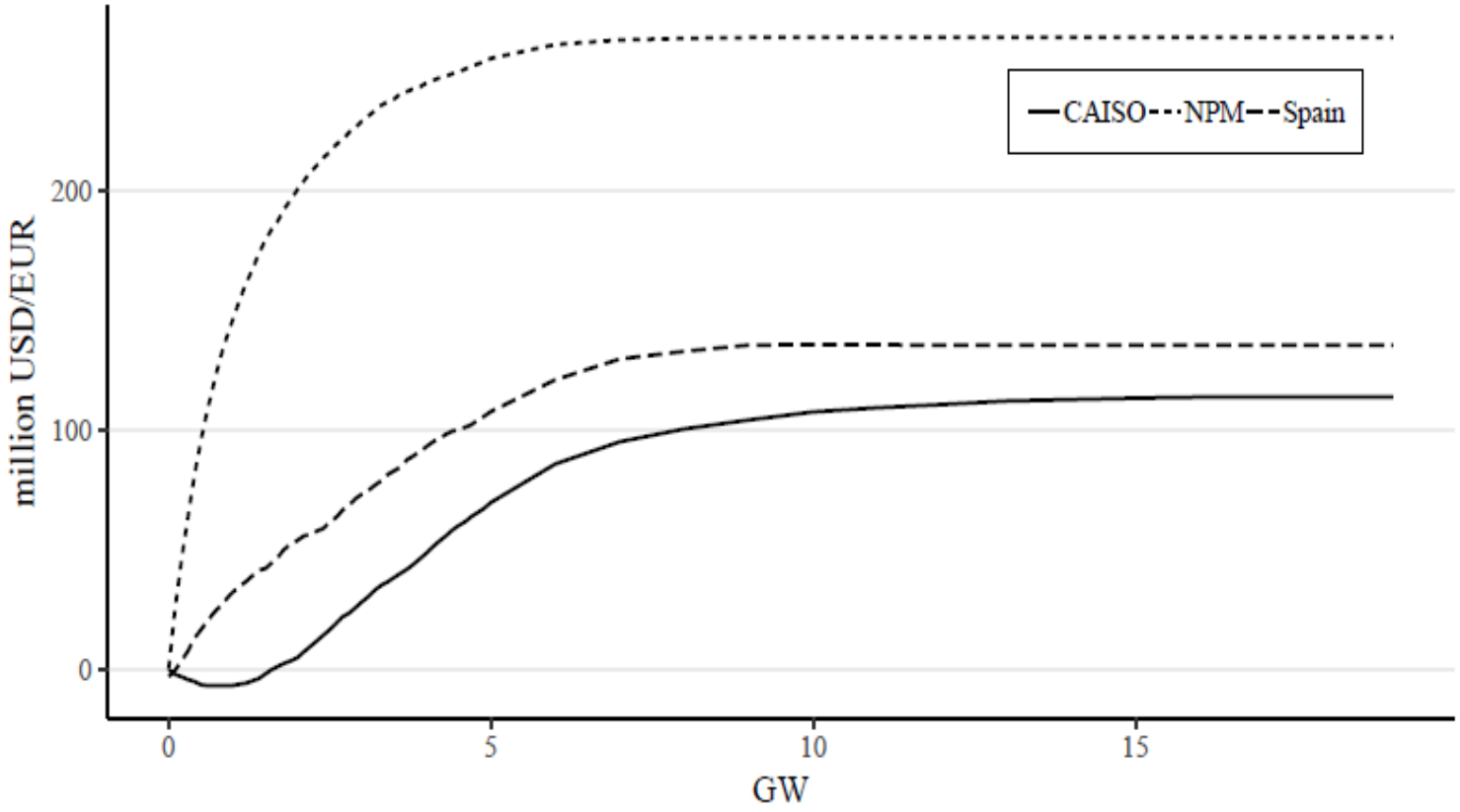
On policy recommendations

- Electromobility and new storage capacity
  - ➔What would be the impact of new entrants in the electricity sector (as car manufacturers) that integrate smart charging (incl. V2G) as part of their business models (or as a selling points) ?

- Flexibility and self-consumption
  - In the paper, investments in flexibility allow consumers to switch demand from an hour to another
  - Development of self-consumption would offer a new alternative for consumers
  - ➔Are your model and conclusions robust when considering self-consumption?

On supplementary results

Figure 16: Change in consumer surplus in year 2017.



Notes: Illustration of the change in consumer surplus in year 2017 as the quantity of flexible technology in the market equilibrium computation increases.

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Thank you for your attention!